

UNION PACIFIC RAILROAD.

REPORT

OF

THOMAS C. DURANT,

Vice-President and General Manager,

TO THE

BOARD OF DIRECTORS,

IN RELATION TO THE OPERATIONS OF THE
ENGINEER DEPARTMENT, AND THE CON-
STRUCTION OF THE ROAD, UP TO
THE CLOSE OF THE YEAR

1865.

NEW YORK:

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TO THE BOARD OF DIRECTORS,

*In relation to the Operations of the Engineer
Department, and the Construction of the
Road, up to the close of the year
1865.*

OFFICE OF THE UNION PACIFIC RAILROAD COMPANY, }
No. 13 William Street, }
NEW YORK, *April 10, 1865.* }

GENTLEMEN :

I have the honor to submit the following report in relation to the surveys, location, construction, and equipment of the Union Pacific Railroad, up to the close of the year 1865.

I.—SURVEYS AND LOCATION.

A reference to the Report upon the surveys and location of the road up to the close of the year 1864, will show that up to that time, the road had been located, and placed under contract, from the *Initial Point*, on the west bank of the Missouri River, near Omaha, a distance of one hundred miles westerly in the great Valley of the Platte River; and that the surveys had been continued

from that point to the one hundredth meridian of longitude. That continuous lines of surveys had been run from Camp Walbach, in the Valley of Lodge Pole Creek; and La Porte, in the Valley of the Cache la Poudre Creek, westerly, over the *Cheyenne* and *Antelope* Passes respectively, converging at a common point near the crossing of the Laramie River; and thence across the Laramie Plains, *via* Bridger's Pass, to Green River; and thence, *via* the Valleys of Echo and Chalk Creeks respectively, and Weber River, to Great Salt Lake City. Also, a line from a point in the Weber Valley, near the mouth of Chalk Creek, *via* Kamas Prairie, Timpanogos Valley, and the Valley of Utah Lake, to a point in the Tuilla Valley. Also, that experimental lines had been run over Berthoud Pass, at the head of Clear Creek, west of Denver City; and over Hoosier Pass, at the Divide between the waters of the South Platte and Blue Rivers.

The result of these surveys had shown the practicability of a route from the head of the Great Platte Valley, *via* the Antelope or Cheyenne, and Bridger Passes, to Great Salt Lake City; and it was therefore deemed advisable, during the year 1865, to make such amendments to the continuous line run in 1864, as had been suggested by the Division Engineers, and concurred in by the Consulting Engineer. Also, to continue the line from the one hundredth meridian to La Porte, and Camp Walbach respectively. To run experimental lines between the Vallies of the Platte and Republican Rivers, with a view to an intersection with the Kansas Branch, at or near the one hundredth meridian. To make a thorough

examination of the passes through the Black Hills, with a view, if possible, of finding a more favorable route than either the Antelope, or Cheyenne Pass. To make a thorough examination of the more northerly routes, *via* the Laramie River, and North Platte, to the South Pass; and thence to Salt Lake City. To examine the practicability of a route from the Valley of Green River, south of the Uintah Mountains, *via* the Uintah River and Spanish Fork, to the Valley of Utah Lake. And, if possible, to extend the surveys from Great Salt Lake City, over the most practicable route, to the dividing line between Nevada and California.

The instructions to the Division Engineers, prepared with reference to the accomplishment of the above results; together with other correspondence bearing upon the same subject, will be found appended hereto, marked "Appendix A."

The line, for purposes of convenient reference, has been divided into two grand divisions; and will be designated accordingly as the *Atlantic* and *Pacific* Divisions respectively; the point of division being the water shed, or dividing ridge of the continent.

The accompanying reports of Messrs. James A. Evans, Engineer of the Atlantic Division; and Samuel B. Reed, Engineer of the Pacific Division (see Appendix B and C), will be found to contain very much of valuable information respecting the routes examined; as well as of the general character of the country, as regards the proximity of iron-ore, coal, timber, and building stone; also the nature of the soil, along the line of the respective routes.

ATLANTIC DIVISION

From Mr. Evans' report it will be seen that the continuation of the line up the Great Platte Valley, from the one hundredth meridian to the mouth of the Cache la Poudre, and thence to La Porte, is quite favorable. After amending the line from La Porte *via* Antelope Pass (as run by Mr. F. M. Case, Division Engineer, in 1864), in some important particulars; and demonstrating the impracticability of reaching the Valley of either the Tappah, or Snake Rivers, by passing over the Medicine Bow Mountains, Mr. Evans ran an entirely new line from Camp Walbach, westerly, along the Valley of Crow Creek and its tributaries, to an intersection with the Cache La Poudre line, on the Laramie Plains. This he assumes to be "the shortest line that can be obtained over the Black Hills, with grades less than 116 feet per mile." He makes it 19.74 miles longer than the line *via* Lodge Pole Creek and Cheyenne Pass; and 34.72 miles shorter than the line *via* the Cache La Poudre and Antelope Pass. He also makes the summit at the crossing of the Black Hills, which I will here designate as *Evans' Pass*, 236 feet lower than Cheyenne Pass; and 374 feet higher than Antelope Pass. He reports the timber upon the Cheyenne Pass line to be more plentiful than upon either the Antelope or Evans' Pass lines, there being at the head of Lodge Pole Creek "a dense grove of Spruce Pine, covering several thousand acres." He also reports that there are no out-croppings of coal to be seen on either of the surveys across the Black Hills in this vicinity; although it occurs in workable veins on Boulder

Creek, also on Coal creek, considerably to the south of these lines; and is also reported to be found on the Cache la Poudre, east of La Porte.

While the foregoing examinations were being made, Mr. Case, with a detachment of the party, made a partial and imperfect exploration of the Laramie Cañon, an account of which will be found in Mr. Evans' Report.

After completing the surveys in the mountains; and finding the season too far advanced to admit of the extension of the surveys, *via* the North Platte, to the South Pass, the line was run from La Porte easterly to the 100th meridian; and surveys were also made of lines east of the 100th meridian, connecting in opposite directions with the line of the Kansas Branch, in the Valley of the Republican Fork; from which it appears that a much more favorable line can be obtained from the Valley of the Republican, in a northwesterly direction to the Valley of the Platte, than from the Valley of the Platte, in a southwesterly direction into the Valley of the Republican. Mr. Evans also reports that "the Valley of the Republican, as compared with that of the Platte, is narrow and crooked, with frequent tributaries, making necessary a large amount of bridging."

PACIFIC DIVISION.

From Mr. Reed's Report it will be seen that, after organizing his party at Great Salt Lake City, and starting them on the surveys of the proposed amendments to his line east of that point, as run in 1864—he, with a small escort, furnished by ex-Governor Brigham Young, started

on an exploration of the route, *via* the Spanish Fork, and White Rivers, to the Green River, south and east of the Uintah Mountains. He found no difficulty in passing from the valley of Utah Lake through the valley of the Spanish Fork, to the valley of White River; but he failed entirely to find a practicable route, or pass, through the mountains, in an easterly direction, from the valley of White River to the valley of the Green River, without following down the White River nearly to its confluence with Green River, and flanking the high and comparatively unbroken spur of the Uintah Mountains, which separates these streams. He was, therefore, compelled to abandon the idea, and return to his party.

After making the revisions contemplated in his line of 1864, he commenced the survey of the route from a point in the line of 1864 (in the valley of Black's Fork) to the South Pass. This survey follows up the vallies of Ham's Fork, Green River, Sandy and Pacific Creeks, through the South Pass, at the head of the Sweet Water; and ten miles down the valley of Sweet Water, to a point $277\frac{35}{100}$ miles from Great Salt Lake City. He makes the altitude of South Pass 7,470 feet above tide. He also reports that, "more obstructions will be encountered at and east of the South Pass, from snow, than at any other place on the lines surveyed."

After completing this survey, and making an extended exploration to the south and east of the South Pass, in the direction of the Medicine Bow Mountains; and finding an apparently open and level plain for the entire

distance, Mr. Reed proceeded to amend his survey of 1864, between the valley of Black's Fork, and his intersection with Mr. Evans' line of 1864, at the mouth of Bitter Creek; after which he returned with his party to Great Salt Lake City.

Failing, on account of the hostilities of the Indians, to receive my instructions with reference to the surveys west of Great Salt Lake; and after consultation with ex-Governor Young, a Director in the road, Mr. Reed very properly commenced a preliminary survey of the line west of that point, which was extended (after running several experimental lines across the ranges of the Cedar and Humboldt Mountains) to the Humboldt River, a distance of 208 $\frac{8}{10}$ miles; and, as he reports, "with grades not exceeding sixty feet per mile, generally over a desert plain, without vegetation, except occasionally patches of sage-bush, grease-wood, and salt-plant; and without fresh water on the line west of the Tuilla Valley, until we get within thirty-five miles of the Humboldt River." "This will leave a distance of sixty miles without fresh water."

In relation to the important items of timber, coal, &c., Mr. Reed reports, that "in the Wind River Mountains, twenty or thirty miles north of the South Pass line, pine, fir, and quaking asp can be obtained," but he has no faith that coal will be found in the immediate vicinity of that route.

On the line from Great Salt Lake City to the Humboldt River, "timber for ties, bridges, and buildings is very scarce, and only found in limited quantities in the first

two ranges of mountains, west of Salt Lake City." He also says, "Some timber, suitable for fuel only, grows in the Humboldt and Cedar Mountains. In all my explorations west of Salt Lake, I examined thoroughly for coal, but did not find any signs of that mineral."

The chief difficulty experienced by Mr. Reed, in his surveys west of Salt Lake, except the hostility of the Indians, was the want of fresh water for his men and animals; and his report contains some interesting and thrilling descriptions of the deprivations and narrow escapes to which himself and party were subjected from this cause. On this account he recommends the substitution of Camels for transportation purposes, instead of horses and mules.

GENERAL SUMMARY OF SURVEYS.

The following is a summary of some of the most important results of the surveys, up to close of the year 1865 :

DISTANCES.

From the initial point at Omaha to the 100th Meridian	246.72
From the 100th Meridian to the head of the Great Platte Valley at Camp Walbach.....	289.21
From Camp Walbach to the summit of the Black Hills at Evans' Pass.....	17.16
From Evans' Pass to Bridger's Pass.....	146.23
From Bridger's Pass to Great Salt Lake City	345.64

From Great Salt Lake City to the Humboldt River at the end of Mr. Reed's surveys.....	208.80
Total length of continuous line as surveyed.....	1253.76

It should be borne in mind that the above distance will be diminished 19.74 miles if computed *via* the Lodge Pole Creek and Cheyenne Pass route ; and increased 34.72 miles if computed *via* the Cache la Poudre and Antelope Pass route.

ALTITUDES.

Missouri River at Omaha.....	965
One Hundredth Meridian.....	2,504
Julesburg.....	3,515
Camp Walbach.....	7,040
Cheyenne Pass.....	8,660
Evans' Pass.....	8,424
La Porte.....	5,052
Antelope Pass.....	8,050
Denver City.....	5,302
Berthoud Pass.....	11,410
Hoosier Pass.....	11,500
Boulder Pass.....	11,900
Rattlesnake Pass.....	7,560
Bridger's Pass.....	7,534
South Pass.....	7,470
Green River at mouth of Bitter Creek..	6,145
East Rim of Salt Lake Basin.....	7,556
Head of Echo Creek.....	6,869
Great Salt Lake City.....	4,286
North Pass of Cedar Mountains	4,604
Great American Desert.....	4,480
Reed's Pass of Humboldt Mountains ..	6,125
Humboldt River.....	5,220

GENERAL CHARACTERISTICS OF THE ROUTE.

From the Missouri River to the head of the Great Platte Valley, at Camp Walbach or La Porte, with the exception of that portion of the line between Omaha and the crossing of the Elkhorn River, which is somewhat undulating, the country is quite favorable for the construction of the road, so far as the graduation is concerned. And that portion of the Platte Valley east of Fort Kearney is not excelled by any country of similar extent on this continent, for its adaptation to agricultural purposes, and the support of a dense population.

Timber, suitable for bridges, depot buildings, and cross-ties; and stone for permanent structures, are very scarce, however, and must as a general thing be transported from a great distance.

From the head of the Platte Valley, through the Black Hill Ranges, to the Laramie Plains, the profiles show a country exceedingly rough, and broken by rocky cañons and transverse gorges, which will render the graduation of the road exceedingly difficult and expensive. Timber, however, is much more plentiful; and building stone quite abundant.

After reaching the plains west of the Black Hills, the line, as it follows the vallies of the principal streams and their tributaries; or crosses the divides between them, alternates in about equal proportions between quite heavy and expensive work, and that which is more favorable, until it reaches Great Salt Lake City. Timber, suitable for the construction of the road, is also found in

greater or less abundance along the mountain ranges in the vicinity of this portion of the line. From Salt Lake City, westerly, the line either passes over dry and barren deserts; or broken mountain ranges, nearly destitute of timber, until it reaches the Valley of the Humboldt River.

The entire country between the rich agricultural regions of the Platte Valley, and the vicinity of Great Salt Lake City, is almost destitute of improvements and population, except miners, adventurers, and tribes of roving, hostile Indians; and the same may be said of the country between the Salt Lake and Humboldt River Vallies.

II.—CONSTRUCTION AND EQUIPMENT.

It was stated in the Report for the year 1864, that "the work of constructing and equipping the first one hundred miles of the road west of Omaha City, was placed under contract early in the season of 1864." This contract was subsequently extended to the One Hundredth Meridian of longitude.

Considerable progress was made, during the year 1864, in the graduation between the Missouri River, and the point where the line enters the Great Platte Valley, at the crossing of the Elkhorn River; and several miles of grading were partially completed, by means of patent excavators, in the Platte Valley, west of the Elkhorn.

In the fall of 1864, Jesse L. Williams, Esq., one of the Government Directors, and Col. Silas Seymour, the Con-

sulting Engineer of the road, visited this portion of the line; and, on their return to New York, united in a recommendation that the Company should change the location of the line between the Missouri River and the Platte Valley, for the purpose of avoiding the heavy ruling grades of eighty feet per mile which had been adopted by the engineer then in charge of the work; and substituting therefor a line about nine miles longer, with maximum grades of forty feet per mile.

The matter was laid before the Board of Directors, at their next meeting, early in January, 1865; and a resolution was adopted approving of the change, providing the facts assumed in the arguments of the Government Director, and Consulting Engineer, in relation to the topography of the country, and feasibility of the proposed line, should be borne out by actual surveys. A survey of the proposed route was accordingly made, which showed results much more favorable than had been assumed; and the work of grading was therefore suspended upon the old line, and commenced upon the new.

Inasmuch as the action of the Board, including the five Government Directors, had been unanimous in adopting this change of route; and their action had been informally approved by the then Secretary of the Interior, who happened to be present when the subject was under discussion; and the views and arguments of the Consulting Engineer had been endorsed by the best and most experienced engineers and railroad managers in the country, no doubt was entertained that the Presi-

dent of the United States would also approve of the change of route, whenever the matter should be properly placed before him.

Application was made to the President of the United States, by Major-General John A. Dix, the President of this Company, on the 12th of May, 1865, for his approval of the change of route. This application, through the opposition of some parties interested in the terminus of the road, resulted in the appointment by the President, upon the recommendation of the present Secretary of the Interior, of Lt.-Col. J. H. Simpson, United States Corps of Engineers, for the purpose of making a personal examination of the respective routes; and a report upon the expediency of the change of location asked for by the Company.

Colonel Simpson did not arrive at Omaha until the following 4th of July. He was then joined by Springer Harbaugh, Esq., Government Director, and Col. Seymour, Consulting Engineer, who accompanied him in his examination of the routes, and so much of the adjacent country as could have the most remote bearing upon the question.

Some further surveys were also made at the request, and under the direction of Col. Simpson, for the purpose of verifying the facts and conclusions which had previously been arrived at by the Engineers of the Company.

Colonel Simpson's report, which fully sustains every position assumed by the Directors and Engineers of the Company, and recommends the approval of the amended

location by the President, was submitted to the Secretary of the Interior on the 18th September, 1865. And the amended line was approved by the President of the United States on the 23d of September.

Several months' delay in the prosecution of the work was thus occasioned, during the most favorable season of the year, by the action of the Government, in consideration of the interference of parties whose mistaken views of their own private and personal interests, led them to oppose, in the most unreasonable and persistent manner, the wishes of the Company in a matter of the most vital importance to the ultimate usefulness of the road, when considered in its relations to the country at large.

The reports of the Consulting Engineer and Government Directors, together with other correspondence bearing upon the subject of this change of location, will be found appended hereto, marked "Appendix D."

The grading, masonry, and bridging required upon the first hundred miles (except the bridge over the Loup Fork River) were completed during the year 1865; and the grading upon the second hundred miles was considerably advanced.

The laying of the track was commenced on the Missouri bottom, near Omaha, on the 10th July, 1864; and would have been extended out into the Platte Valley, a distance of upwards of sixty miles, before the freezing of the ground, but for the delay of the Government above referred to, in deciding upon the question of location. Forty miles, however, of continuous superstructure, together

with the necessary sidings, were completed at the close of the year. Large and commodious machine shops and engine houses were also constructed of brick, at the eastern terminus of the road; together with the necessary station houses, and water stations, upon the first forty miles. A powerful stationary engine, together with a large amount and variety of tools, and other machinery required for construction and repairs of rolling stock, were also placed, and put in operation in the shops. Four first-class locomotive engines, two first-class passenger cars, twenty-five second-class, baggage and freight cars, thirty-four platform cars, and nine hand cars, were also placed upon the line.

In addition to the above, the iron-rails, chairs, spikes, and cross-ties for twenty-two additional miles of superstructure, together with several thousand cords of wood, were delivered on the line, ready for use, at the close of the year 1865. Also one large burnetizing machine, and one large sawmill were in operation upon the Depot grounds at Omaha; and five portable sawmills were in use, manufacturing cross-ties, bridge, and car lumber, at the most available points along the Missouri Valley, and the line of the road.

The chief difficulty and embarrassment that has arisen, thus far, in the rapid and economical prosecution of the work, has been the want of a railroad connection at the eastern terminus.

We have been, and in all probability will, for a year to come, be obliged to rely entirely upon the tedious and

uncertain navigation of the Missouri River, during the summer months, for the transportation of all our iron-rails, chairs, spikes, locomotives, cars, machinery for shops, sawmills, &c., together with a large amount of our building materials, bridge timber, and cross-ties.

If the parties who control the various railroad lines which are intended to connect with the eastern end of the Union Pacific Railroad, had been actuated by the same motives, and impelled by the same energy which have characterized the operations of this Company, this state of things would have been remedied long before the present time ; but as it is, I regret to say that we cannot reasonably hope for such a connection before the coming year.

III.—CONCLUDING REMARKS.

The progress already made in the location and construction of this great National Work, is such as to render the speedy completion of the Union Pacific Railroad, a fact established beyond the reach of any ordinary contingency.

The recent bloody and devastating civil war, which has to so great an extent absorbed the labor, capital, and resources of the country, would appear to have been a sufficient cause for the entire suspension of operations upon this road, as it has been upon all other works of internal improvement throughout the country. But the Company has not hesitated nor looked backward during

all the dark years of our Nation's history and peril. It has, on the contrary, looked steadily forward; facing and overcoming all the difficulties and obstructions which have been placed across its path; gathering additional strength and courage as it advanced; until now, with the restoration of peace and union throughout the country; and the consequent return of labor and capital to its legitimate channels, there can be no reasonable doubt of its entire ability to accomplish the great work which it has undertaken, in the manner, and within the time required by law.

The time has now arrived when, in my judgment, the Company should consider and act upon the suggestion contained in my last year's report, with reference to the establishment of iron-works for the manufacture of rails, chairs, spikes, &c., at the most practicable point between the head of the Great Platte Valley, and the meridian of Great Salt Lake City.

Unless prevented by circumstances now unforeseen, and which shall prove beyond the control of the Company, it is confidently hoped that, by the close of the present year, the track will be extended as far west as the one hundredth meridian of longitude; and that the grading will be completed considerably in advance of that point.

The surveys of the present year, it is believed, will also enable the Company to make a definite location of the route of the road, as far west as the meridian of Great Salt Lake City.

With a view, therefore, to the uninterrupted prosecution of the work; and the extension of the track through and beyond the Black Hill ranges of the Rocky Mountains, it is submitted, that no time should be lost in making the necessary preparations for supplying that distant portion of the road with all the iron required in its construction, from the materials which nature has so lavishly distributed along its route; and thus save the delay and enormous expense attending its transportation some thousands of miles from the Atlantic States.

Major-General John A. Dix, the President of the Company, has, on account of the responsible duties imposed upon him by the Government during the late war, been able to devote but a small portion of his valuable time to the affairs of the Company. The labors and responsibilities of its management have therefore devolved principally upon myself, as Vice-President; and the Hon. John J. Cisco, Treasurer, whose great experience and enlightened judgment in financial matters, have been of the greatest service to the Company. I am also indebted to Col. Silas Seymour, the Consulting Engineer, for valuable suggestions and advice, which his long and varied experience in the construction and management of railroads, and other works of internal improvement, has rendered him so competent to give.

The thanks of the Company are due to Messrs. Samuel B. Reed, and James A. Evans, Division Engineers, and the Assistants under them, for their untiring devotion to the interests of the Company; and the zeal and

energy which they have manifested in the performance of the duties assigned to them.

The Company is also under continued obligations to the civil and military authorities, along the lines of the respective routes surveyed, for the kindness and protection extended by them to the parties in the field.

All which is respectfully submitted.

THOMAS C. DURANT,
Vice-President and General Manager.

TO THE PRESIDENT AND DIRECTORS
Of the Union Pacific Railroad Company.



APPENDIX A.

Instructions to DIVISION ENGINEERS, and Correspondence respecting Surveys,

1865.

Mr. Seymour to Mr. Durant.

ENGINEER DEPARTMENT, U. P. R. R. Co.,
No. 13 William Street, New York, *April 4th*, 1865. }

THOS. C. DURANT, Esq.,

Vice-Prest. U. P. R. R. Co. :

Dear Sir,—In accordance with your request, I have the honor to submit for your consideration the following suggestions with reference to the organization of this department of your road; together with the operations in the field during the coming season.

1st.—Organization.

The topographical features of the country through which the line of the Union Pacific Railroad is to pass, between the Missouri River and the easterly line of the State of California, naturally suggest the division of the line, for engineering purposes, into two principal divisions, the point of division to be at the summit or dividing ridge of the Continent. The eastern may be appropriately called the "*Atlantic Division*," and the western the "*Pacific Division*."

The surveys and explorations upon each of these divisions should be conducted under the immediate charge and supervision of a competent Division Engineer, who will receive his

instructions from, and report directly to this office. Each Division Engineer should be furnished with as many field parties as may be necessary to enable him to perform the labor, and obtain the information required under his instructions: and at the head of each party should be placed an Assistant Engineer, competent to conduct the operations of the party under instructions from the Division Engineer during his absence on reconnoitering or other duty.

The organization of the field parties should be about as follows: One Assistant Engineer, one Leveller, one Transitman, two Rodmen, two Chainmen, two Axmen, one Flagman, together with such other assistance as the subsistence and transportation of the party may require.

2d.—Field Operations.

With reference to the extent of operations in the field during the coming season, I would suggest the desirability of an approximate location and estimate being made upon the general route, which from present information appears the most favorable, as far west as Great Salt Lake City; and that surveys or explorations be made of such other routes, east of Salt Lake, as have not already been examined, and as, from the best information in your possession, may be regarded either in an engineering or commercial point of view, competing routes for the final location of the road. The above, together with such surveys and explorations as may be deemed advisable west of Salt Lake City, will probably be all that you will accomplish during the present season.

It seems quite important that the surveys necessary to enable the President of the United States to make an intelligent decision as to the proper location of the route across the 100th meridian, should be made as soon as possible; and, as this question must be controlled to a very great extent by the most favorable route to be selected west of the head of the Great Platte Valley, it is suggested that the surveys bearing upon this question should be among the first to be commenced this year.

If the suggestions above made with reference to the creation of two principal divisions of the road, should be concurred in;

and the Division Engineers should be selected from those who have already made surveys and become familiar with the country through which the various routes pass, I would suggest the expediency of deferring detailed instructions until the appointments be made, and the Division Engineers consulted upon the subject.

Very respectfully,
Your Obt. Servt.,
S. SEYMOUR,
Consulting Engineer.

Instructions to Mr. Reed.

UNION PACIFIC RAILROAD COMPANY,
No. 13 William Street, New York, }
April 28th, 1865. }

SAML. B. REED, Esq.,
Division Engineer,
Omaha, N. T. :

Dear Sir,—You will please proceed at once to Salt Lake City, and make arrangements for organizing your party for active service, taking with you Mr. Schimonsky as your first assistant; and also, if you desire to take a second, let it be Mr. Bissell.

While your arrangements are being perfected, you will either send your first assistant or go yourself with a small party and make a reconnoissance of the country at the head of Spanish Fork, in order to ascertain if there is a feasible route from the Salt Lake Basin into the valley of one of the streams leading into the Uintah and Green Rivers, the result of which you will report to this office by telegraph. This may not occupy more than two or three weeks; and your locating party can, when ready, re-locate the line north of Salt Lake City, with the view of shortening the line to the mouth of the Weber River Cañon; or may in your discretion proceed on that line to the vicinity of Muddy Fork, or such other portion of the line already run as may be most desirable, and run a line through the South Pass into the Valley of the Sweet Water.

You will also make further examinations in the vicinity of

Green River where your line of 1864 intersected the line run by Mr. Evans.

You will keep me advised as to where telegrams will reach you, as I may have further directions to give on learning the result of your examination of the Spanish Fork.

Yours respectfully,

THOS. C. DURANT,
V.-P.

Mr. Durant to Mr Reed.

OFFICE OF THE UNION PACIFIC R. R. Co.,
No. 13 William street, New York,
April 28th, 1865. }

SAML. B. REED, Esq.:

Division Engineer,
Omaha, N. T.:

Dear Sir,—In case you need an escort for any part of your surveys during this season, apply to Maj.-Gen. G. M. Dodge, who will probably order it furnished.

You may be able to make use of the men furnished for escort in some part of your field operations, and reduce the number of your own men and amount of transportation.

Gen. Dodge will do anything he can consistent with his duties to the Government, to aid us in our operations this season.

Yours respectfully,

THOS. C. DURANT,
Vice-Pres.

Instructions to Mr. Evans.

UNION PACIFIC R. R. COMPANY, }
President's Office, 13 William Street, }
New York, *May 5th*, 1865. }

JAMES A. EVANS,
Division Engineer,
Omaha, N. T.:

Dear Sir,—The following named persons have been assigned to duty in your party, viz.:

F. M. Case, Principal Assistant Engineer.

Fred. Hodges, Rodman.

P. T. Browne, 1st Assistant Engineer.

F. E. Ransom, Do.

John O. Neile, 2d Assistant Engineer.

Saml. H. Gilson, Do.

C. F. Dutton, Transitman.

Mr. Dutton has been notified at Oberlin, O., to report to you at Omaha. The balance of your party you will select at Omaha, or such point as you may think best. It is very important that we should be able to file our map of location at the earliest possible day, and your instructions for this season's operations are framed with a view of obtaining the best possible information on this subject within the shortest time practicable.

Your party is so formed that you will be able to make personal explorations, while Mr. Case is carrying out your directions as to the line you wish to have run; and it is also so framed that when, in your judgment it may be advisable, Mr. Case can leave the party temporarily in charge of Mr. Browne, and make personal examination of the ground in advance of his party, or at such other points as you may designate.

After fully organizing your party at Omaha, you will proceed at once to the point where the Platte River crosses the 100th meridian of longitude, and commence to run a line, upon the most favorable route, to La Porte, on the Cache la Poudre. After establishing a proper starting point, to which reference may be made in future surveys, in the vicinity of the 100th meridian; and getting the party well under way, you will leave the

party either in charge of Mr. Case, or Mr. Browne, as you may think best, and proceed either with, or without either of these gentlemen, in advance of the party, and make a careful reconnaissance of the country between the Cache la Poudre valley and the North Park, or the head waters of the North Fork of the Platte River, with a view of ascertaining with reasonable certainty whether a feasible pass can be found south or west of Antelope Pass through which a line can be run to connect with the head waters of the Bear or Little Snake River.

This will also involve the examination of the country west of the valley of the North Platte, in order to ascertain whether a feasible Pass can be found through the divide of the Continent south of Bridger's Pass. If the above exploration should furnish reasonable evidence that a practicable route can be found considerably to the South of Bridger's Pass, so as to strike the waters of the Green River south of the easterly bend (below Brown's Hole), which flanks the Uintah mountains, you will cause such surveys to be made as may be necessary to institute a comparison between this and the more northerly route, as surveyed in 1864.

If the explorations should prove that a feasible route, as above indicated, is impracticable, then you will explore the country between the Lodge Pole and Cache la Poudre valleys, with a view of ascertaining whether a better route than those already surveyed *via* Antelope and Cheyenne Passes can be found between the head of the Great Platte Valley and Bridger's Pass; if so, you will have this route surveyed.

If the explorations should result unfavorably, then you will direct your party, after having extended its surveys to La Porte, and made such improvements as you may deem advisable in the routes surveyed in 1864, between that point and Bridger's Pass, *via* Antelope Pass, to proceed to the South Pass, and run a line easterly along the Vallies of the Sweet Water, and North Fork of the Platte River to Fort Laramie.

While this is being done, you will make a thorough personal examination of the Laramie Valley and Cañon, from the mouth of Laramie River to the Laramie Plains; and then of the most direct route to the respective junctions of Rock Creek, and the Sweet Water with the North Fork of the Platte, with a view of

connecting the line down the Sweet Water with the South Pass. After this is done, and you have communicated further with your party, you will return toward Fort Laramie in advance of the party, and make a careful reconnoissance of the valley and country adjoining the North Platte to Fort Laramie, with a view of furnishing instructions to your party respecting the proper line or route to be surveyed.

The foregoing instructions are intended merely as a general outline of the work that yourself and those acting under you will be expected to perform during the present year; and very much discretion as to details must necessarily be left to yourself.

You will keep Mr. D. H. Ainsworth, Engineer in charge at Omaha, advised as fully as possible where dispatches and letters will reach you; and you will report fully by letter to this office as often as once a week, when practicable. You will also be governed by such further instructions as you may receive from time to time, from this office.

Yours very respectfully,

(Signed) THOS. C. DURANT,
Vice-President.

Mr. Durant to Mr. Evans.

OFFICE OF THE UNION PACIFIC R. R. Co. }
No. 13 William Street, }
New York, May 5th, 1865. }

JAMES A. EVANS, Esq.,

Division Engineer,

Omaha:

Dear Sir,—In case you need an escort for any part of your surveys, during this season, apply to Maj.-Gen. G. M. Dodge, who will probably order it furnished.

You may be able to make use of the men furnished for escort, in some part of your field operations, and reduce the number of your own men, and amount of transportation.

Gen. Dodge will do anything he can, consistent with his duties to the Government, to aid us in our operations this season.

Yours respectfully,

THOS. C. DURANT,
Vice-President.

Mr. Dnrant to Mr. F. M. Case.

OFFICE OF THE UNION PACIFIC R. R. Co., }
No. 13 William Street,
New York, May 6th, 1865. }

F. M. CASE, Esq.,
Omaha, N. T. :

Dear Sir,—In arranging our engineering parties for this season, it has been considered best to divide our line into two grand divisions, the one on the east side of the divide of the Rocky Mountains to be called the Atlantic Division, and the one west of the divide, the Pacific Division.

With this view of a permanent organization, it has been decided to place, for the present, Mr. Evans in charge of the Atlantic Division, and assign you to duty with him, as principal assistant. It is expected that in a short time we shall be prepared to make two parties of this one, when you will be expected to take charge of one of the parties.

In the meantime your salary will remain as heretofore.

Yours respectfully,

THOS. C. DURANT,
Vice-Prest.

Mr. Reed to Mr. Durant.

GREAT SALT LAKE CITY, UTAH, }
June 21st, 1865.

THOS. C. DURANT, Esq.,
V.-P. U. P. R. R. Co.,
No. 13 William St., N. Y. :

Dear Sir,—I have just returned from exploring the country up Spanish Fork, and over the mountains, to the head waters of the Uintah River. On account of the decided hostility of the Indians in that part of the country, I took with me a party of thirteen men; our route was up the Spanish Fork Cañon to the head of the same, about forty miles; thence, over a very low Divide, to White River, one mile; thence, up a tributary of White River, to the summit of the Wahsatch Range, five miles; thence, down a tributary of the Uintah River, ten miles; thence, northwesterly, to Strawberry Cañon, fifteen miles; thence, up Strawberry Cañon and Valley, twenty-five miles; thence, over the Wahsatch Mountains, to the head waters of Hobble Creek, and down that stream to Utah Lake Valley.

From Utah Lake Valley, a practicable line can be obtained up Spanish Fork to White River; from there to the Uintah, the mountains are very high and precipitous, the cañons deep, narrow, and crooked; totally impracticable for a railroad. There is no possibility of getting a line over the range north of Spanish Fork until we reach Timpanogos, where I ran a line last season.

From information obtained from A. Huntington, Indian Agent, I think a practicable line may be found by following down White River, from the head of Spanish Fork (South) to Green River, about one hundred and forty miles (see Beckwith's map); this would increase the length of the line very materially. I did not explore that valley for two reasons: First, I did not have sufficient food; and, secondly, my men would not go into that country on account of the hostile Indians. While we were in the mountains east of Spanish Fork, on the 16th of June, there was a severe snow storm; after the storm, 12 o'clock M., there was ten inches of snow on the ground.

My party are now at the head of Echo Cañon, trying to avoid the heavy work on last year's line at that place. I shall join them to morrow and go to Ham's Fork, and commence the line to South Pass; after completing that, shall run a line down Green River, from my last year's line, to Bitter Creek; this will take me about two months. Please send instructions what to do next, also authority to draw for money to pay expenses.

I remain yours very respectfully,

SAML. B. REED,

Div'n Engineer.

Mr. Evans to Mr. Durant.

CAMP IN THE BLACK HILLS, }
July 10th, 1865. }

THOMAS C. DURANT, Esq.,

Vice President U. P. R. R.,

No. 13 William Street, New York.

Dear Sir:—We arrived at La Porte on the 4th, and our line is now fifteen miles in the hills; the indications are that we shall be able to obtain a favorable line here.

My intention is, in accordance with instructions, to examine every available opening between the starting point of this line and our line of last season. I shall, therefore, after producing the line a few miles further, make an effort to follow some tributary of the Box Elder Creek, which, if practicable, would save something in distance.

The Indians seem to have complete possession of this country; we find it necessary to keep out sentinels day and night. I therefore do not consider it prudent to divide the party at present.

Should the line we are now running prove to be the best, I am inclined to think it advisable to cross the South Fork of Platte as soon after reaching it on our way East as possible; thence keeping on the south side of the river altogether, as far as Skinner's Ferry (130 miles below Fort Kearney), connecting with our present line below Columbus. The amount of bridging

would be less, and would do away with the necessity of a southern connection crossing the Platte, near the 100th meridian. Of this, however, you can instruct me further.

Very respectfully yours,

JAMES A. EVANS,

Div. Eng'r.

Mr. Evans to Mr. Durant.

LARAMIE PLAINS, *July 23d*, 1865.

T. C. DURANT, Esq.,

Vice-Prest. Union Pacific Railroad,

No. 13 William Street, New York :

Dear Sir,—Our Cache la Poudre line is over the summit. We should have made our connection ere this had the weather permitted; as it is, a few more working days will enable us to intersect my line of last year.

The grades on this line are below the maximum. The work for a good part of the distance, light; the heaviest points are the crossings of Poison and Dale Creeks. I send you a sketch and profile of the latter. We can make no better crossing of it, for the reason that we have to keep up to overcome elevation beyond.

After connecting the lines, I design following up the main branch of the Laramie River to some tributary from the mountains forming the eastern boundary of the North Park. I have heard nothing from Mr. Reed yet, with reference to the head of Spanish Fork; the irregularity of the mails, caused by Indian depredations is perhaps sufficient reason; I do not anticipate much profitable information from this reconnoissance.

We shall run a line across the Black Hills *via* the head of Crow Creek, making a detour to the south, and aiming for a branch of the Lodge Pole. Should this prove a better line than the one just run, will start the party east on that stream (Lodge Pole Creek) unless I hear from you in the interim to the contrary; communications will reach me with the greatest cer-

tainty at Camp Collins, Colorado. If in haste, telegraph to Denver, to be forwarded thence by mail.

With reference to the Laramie Cañon, as far as my opinion is concerned, I beg to refer you to my report of last year. I shall request Mr. Case to examine it and report on its practicability.

It will be extremely difficult making any explorations on the North Platte this season on account of the Indians being in that country in force; will place myself in communication with General Conner, in command of the District, and see what can be done. In consequence of the lateness of the season, it can result in nothing more than a mere examination.

Very respectfully yours,

JAS. A. EVANS,

Div. Eng.

Mr. Reed to Mr. Durant.

GREAT SALT LAKE CITY, U. T., }
July 26th, 1865.

THOS. C. DURANT, V. P.,
13 William St., N. Y.:

Dear Sir,—I send you map and profile of the line as run over the sand ridge at the mouth of Weber Cañon. The line was run while I was exploring the country of Spanish Fork. From subsequent examination and side levels, I can run as shown on map, by dotted line, which will give a profile like the dotted line on the profiles.

This line will save ten miles of road; but the work is expensive, and grades and curves very objectionable. There will be a heavy coal trade from Weber Valley, east of the Wahsatch Mountains, to Salt Lake; and the usefulness of an engine would be limited to what it could haul up the maximum grade.

The heavy cut at the summit of the ridge will be mostly quicksand; after descending into Kay's Creek there is no difficulty to junction with old line.

I will send map and profile of line at head of Echo Cañon, and at South Pass, as soon as I can get them made.

Yours very respectfully,
SAML. B. REED,
Div. Engineer.

Mr. Reed to Mr. Durant.

GREAT SALT LAKE CITY, U. T., }
July 26th, 1865. }

THOS. C. DURANT, V. P.,
13 William Street, N. Y. :

Dear Sir,—I arrived here last Saturday evening with my party.

I ran a line from my last year's survey to South Pass, and into the Valley of Sweet Water, starting at a point on the old line, near Ham's Fork, and ran over the divide to Green River, at the mouth of Big Sandy, and up that stream to South Pass. There is no serious difficulty to be encountered on the line run, light grades and easy curves, except from Pacific Springs to the summit at South Pass, three miles; there the grade will be 80 to 100 feet per mile—excavations and embankments light. From the summit to the Valley of the Sweet Water, ten miles, the grade will not exceed 13 feet per mile, with very light work. After I had completed my survey, I went on horseback south into an unexplored country; and find that between Sweet Water and Bitter Creek, after crossing the low range of mountains that lie south and parallel to Sweet Water, there is a great desert plain extending east as far as I could see, without a mountain or hill, and west to the low mountains, south of Sandy; and I followed around the base of the mountains southwest and found a pass through into the Valley of the Sandy, about 20 or 25 miles southwest of South Pass. This route, if the North Platte route is adopted, would be preferable to the South Pass, on account of its being less snowy in the winter.

I have run a line from Black's Fork, about 12 miles below Ham's Fork, to the mouth of Bitter Creek, entering Green River

Valley, six miles above the mouth of Bitter Creek; and will send map and profile as soon as I can get them made. I am now waiting orders what to do.

Yours very respectfully,
SAMUEL B. REED,
Div. Engineer.

Mr. Evans to Mr Durant.

BIG LARAMIE, *July 31st, 1865.*

THOMAS C. DURANT, ESQ.,
Vice President Union Pacific R.R.:
No. 13 William Street, New York.

Dear Sir,—Our Cache la Poudre line is completed and Crow Creek line started. By increasing distance on the latter, grades can be obtained within the maximum on the western slopes of Black Hills, with fair profile. What we can do on the eastern side remains to be determined.

Mr. Case left for Laramie Cañon this morning, accompanied by some of the party and part of our escort. During their absence will run line up Laramie River to the divide between these plains and the North Park, leaving the Crow Creek Valley for the present.

Very respectfully and truly yours,
JAMES A. EVANS,
Div. Engr.

Mr. Reed to Mr. Durant.

GREAT SALT LAKE CITY, U. T., }
August 2d, 1865. }

THOS. C. DURANT,
V. Presdt. U. P. R. R. Co.,
No. 13 William Street, New York :

Dear Sir,—I have been here with my party, ten days, waiting your instructions.

The telegraph line has been down ever since I came in, and there is no certainty of getting letters by mail within two months after they are written ; (I received one yesterday morning, dated 6th June, at Joliet). In consequence of my inability to receive instructions, I have, with the advice of Gov. Brigham Young, decided to proceed at once with the surveys west of Salt Lake. I shall resume work at the end of the line of last year ; and run around the south end of Salt Lake, crossing the desert at Humboldt Mountains, and over those by the best path I can find, to the valley of Humboldt River.

To outfit my party for this survey, I have drawn on John J. Cisco, Treasr., for \$2,000.

I remain yours very respectfully,
SAML. B. REED,
Divn. Engineer.

Mr. Durant to Mr. Reed.

UNION PACIFIC R. R. Co., }
No. 13 William Street, New York, }
August 17th, 1865. }

S. B. REED,
Division Engineer,
Great Salt Lake City :

Proceed with preliminary surveys *via* Humboldt Valley, to California line at Truckee Pass, provided you have time this season,—and are satisfied with your explorations up Spanish

Fork. Send information relative to your amended lines, so that we may commence work in Utah.

THOS. C. DURANT,
Vice-President.

Mr. Durant to Mr. Evans.

UNION PACIFIC R. R. Co.,
No. 13 William Street, New York, }
September 25th, 1855.

JAS. A. EVANS,
Division Engineer,
Omaha, N. T.,

Line must be run up Lodge Pole Creek, to connect with line through Cheyenne Pass. Also at or east of 100th meridian, line from Republican Fork into Platte Valley; and from Platte Valley into Republican Fork, both looking westward.

T. C. DURANT,
Vice-President.

Mr. Evans to Mr. Durant.

COTTONWOOD SPRINGS, }
October 24th, 1865.

THOS. C. DURANT,
Vice-President U. P. R. R.,
No. 13 William St., N. Y.:

Dear Sir,—We crossed the North Fork of Platte yesterday the best crossing that we can obtain will be 2,400 feet.

The Indians have made their appearance in the valley in force, have complete possession of the road above, to within thirty-five miles of this place. My escort consists of only forty men notwithstanding General Heath's representations to you while at Omaha, to the contrary; am afraid the brutes will drive us in, before we can make our connection.

Very respectfully yours,
JAS. A. EVANS,
Div. Engineer.

Mr. Reed to Mr. Durant.

JOLIET, Illinois, 1st Nov., 1865.

THOS. C. DURANT,
V. P. U. P. R. R. Co.,
13 William Street, N. Y.:

Dear Sir,—I arrived here last evening from Salt Lake City.

Your telegram of August 17th, instructing me to make a survey *via* the Valley of the Humboldt River to the Valley of the Truckee at the east line of the State of California, was received September 7th, while I was exploring the Humboldt Mountains, too late in the season to get provisions for my party; and was reluctantly compelled to abandon the survey without reaching the Truckee.

The country from Salt Lake west to the Humboldt Valley, at Gravelly Ford, has been thoroughly explored, and a line surveyed, with the exception of about seventy-five miles across the desert, which I could not run on account of the impossibility of obtaining water for my men and teams.

From the surveys made, I am satisfied that a line can be obtained from Salt Lake City into the Valley of the Humboldt River, without a cut or embankment exceeding fifteen feet, or grades exceeding seventy-five feet per mile.

Three lines were run over the high rugged range of the Humboldt Mountains; and one *via* Hastings's Pass, near the south end of Ruby Valley; one over Humboldt Pass, recommended by Beckwith to be a favorable route, which I find to be almost impracticable. The third, about twenty miles north of Humboldt Pass, which is much better than either of the former lines, with a fine, open, and comparatively level country east of the desert.

Before leaving Salt Lake, I settled my accounts with President Young, and gave him my draft on John J. Cisco for the amount due.

One draft for \$1,500, in favor of J. Y. Green, one for \$2,000, and one for \$1,930 39, both in favor of Brigham Young, all dated October 9th, 1865.

I wish to make my profiles, maps, and report here, if consistent with your views. Can go to New York any time you may require. Please let me hear from you in regard to my office work.

Yours, very respectfully,

SAML. B. REED,
Divn. Engr.

Mr. Evans to Mr. Durant.

FORT KEARNEY,
November 6th, 1865.

T. C. DURANT, Esq.,

Vice-Prest. Union Pacific R. R. Co.,

No. 13 William Street, New York :

Dear Sir,—I have just completed line from 100th meridian to the Republican River.

The surveys from the mountains are also connected at the 100th meridian, giving us a continuous line from the Missouri to Salt Lake. I am very glad this has been done. When I wrote you from Cottonwood, it seemed doubtful. Will now run line from this vicinity southwesterly.

Very truly and respectfully yours,

JAS. A. EVANS,
Div. Engr.

APPENDIX B.

*Report of JAMES A. EVANS, Division Engineer,
on Surveys made in
1865.*

ATLANTIC DIVISION.

OMAHA, January 15, 1866.

Sir,—I respectfully submit this my report of surveys for 1865, with the accompanying maps and profiles.

Having received the necessary instructions at Omaha, the party fully organized started from that place on the 30th of May, (previous arrangements having been made with Major-General G. M. Dodge to have escort furnished at Fort Kearney,) taking the usual route on the north side of the Platte, and expecting to cross the Loup Fork at Columbus. The summer freshet in the Platte River and its tributaries, consequent upon the melting of the mountain snows, and which usually makes the streams impassable for transportation of any kind, for a time varying from two to five weeks in the summer months, occurred in 1865, earlier than usual, caused as I suppose by a greater deposit of snow than the average during the previous winter, prevented our crossing the Loup Fork, at Columbus, or the Platte river at Shinns ferry. It was ascertained by telegrams from Colonel Livingston, then commanding at Fort Kearney, where our escort was waiting our arrival, that it would be impossible to move the detail, with their transportation to the north side of the Platte—a thing absolutely necessary to the literal carrying out of my instructions. There seemed to be no alternative but to return to Omaha, cross the Missouri River there, follow down

it on the Iowa side, recross below the mouth of the Platte, and keep on the south side to Fort Kearney. This would enable us to meet our escort, and the hope was entertained that the high water would in the meantime so far subside, as to enable us all to cross the river, and still carry out the original programme. This hope was not realized, as upon reaching the Fort, upon the 10th of June, crossing was still impracticable. We therefore pushed for La Porte, with the purpose of doing the required work in the Black Hills, leaving the examination of the Platte Valley, west of the 100th meridian of longitude, until our return.

Our escort consisted of 45 men of the 1st Nebraska Veteran Cavalry, Captain Thomas H. Griffen, in command. The party and escort reached La Porte on the 4th of July. It became evident now that in consequence of the lateness of the season, the interference caused by high-water below, coupled with the total impossibility of dividing the party (for the reason that the country west, north, and east of us, was full of bands of roving and hostile Indians), there would be neither time nor opportunity to do anything in examination of the North Fork of the Platte, unless the Survey of the valley of the South Platte, east of La Porte, was postponed. This impression became more and more certain as the season advanced, and the Indian difficulties increased.

While in the Black Hills, wishing to obtain information as to whether the examination of the North Platte or South Platte were the most important, I wrote you from Antelope Pass. The mails at that time being uncertain, no answer was received by me to the communication. When the time came, therefore, to decide, my judgment seemed to indicate that the South Platte should be the line run. My reasons (in the absence of instructions) were, that by doing so, we should as far as that route was concerned make it complete, and obtain data of distance and elevation, that would be reliable, and, if nothing more, furnish a basis with which all subsequent surveys could be compared.

As before stated, we reached La Porte, on the Cache-la-Poudre, July 4th, then connecting our line with the United States lineal surveys, we commenced our examination of the

CACHE-LA-POUDRE LINE.

This stream having its source in the Snowy Range, after a tortuous course through cañons and narrows, and taking in the drainage of the Black Hills, issues from the mountains at La Porte. Its character immediately changes from a mountain torrent, to a comparatively quiet and placid river, furnishing water power to any extent, and easily made available. It is proper to state that the approaches to the mountains here are more favorable than at any other point between Denver and Fort Laramie, a distance of 230 miles. The plains to this point stretching to the very base of the hills, the profile will show that our line up the valley of this stream from Latham to La Porte, is as favorable, and the grading as light, as over any portion of the Platte Valley of equal distance.

This is not the case with the lines north, as the remarkable depression known as the Cheyenne Pass, extending from Crow Creek, on the south, to the head of the Chugwater on the north, and crossing our line of last year at right angles, prevents our reaching Camp Walbach with continuously ascending grades. The topography of the basin itself is somewhat broken, as well as the country, for some distance east of it. My report of 1864, says, that the first fifty miles of Lodge Pole Creek, from the mountains east, is not as favorable as the lower part of its course. The approaches to the Black Hills, at La Porte, are in very decided contrast with this, as will be seen by an examination of the profile. From La Porte northwesterly, our line follows the Cache-la-Poudre for three miles only, its direction from that point being useless for our purpose, as well as leading us into impassable cañons in the primary rocks; our line, therefore, continues in the ravines of the stratified rocks, until it touches the granite in Stonewall Cañon, on Stonewall Creek, a tributary of Dale Creek, itself an affluent of the Cache-la-Poudre. We continue in its (Dale Creek) drainage, until the summit of the range is reached at Antelope Pass.

A line was run here in 1864 by Mr. Case, for the purpose of determining gradients. Much valuable information was obtained then, and furnished by him during the progress of the work from La Porte to the connection with my line of last year, on the Laramie Plains. We are now enabled to furnish an ap-

proximate estimate of quantities. Mr. Case's suggestions with reference to this line were found accurate, and adopted, and the line, as shown on the map, is substantially the one proposed by him last year.

The improvement that I would suggest in this line is, that instead of striking the range at La Porte, our line from the eastward should leave the valley of the Cache-la-Poudre at, or still further east than the mouth of the Box Elder Creek, passing through a gap in the Sand Stone, near Park Station of the Overland Stage Company, and intersecting the line from La Porte, at Station 722. This line was run through the hills far enough to give profile, and to enable us by plotting to obtain distance, which will be shortened two miles, the grades will be less, as it will obviate one important undulation of grade, and the alignment will be much better, as well as promising greater freedom from snow obstructions than that portion of the line between the intersection and La Porte. The amount of grading on either line to the point of convergence is light. The salient points on this (Cache-la-Poudre line) are: The grading through Stonewall Cañon, a distance of two miles, and the crossing of Poison and Dale Creeks, all of which, as to extent, depth, &c., will be made evident by an examination of the accompanying maps and profiles.

The most economical means of crossing the two latter would be by means of truss bridges, with piers and abutments, as from the great quantity of water discharged by the stream at certain seasons of the year, considerable water-way would have to be provided, by means of arch culverts, if a different mode of construction were adopted. The material for embankment would be rock, the greater part of which it would be necessary to borrow.

Where the Dale Creek crossing occurs, on the profile, a comparative estimate will be found—1st, of embankments, with arch culvert; and 2d, of truss bridging, with pier and abutments. In the estimate of quantities, the fills are supposed to be made by borrowed material, that plan was adopted in the estimate of last year, it has for that reason been continued in this.

The grades on the line are within the maximum, as shown by the following condensed

MR. EVANS' REPORT.

TABLE OF GRADES.

	ASCENDING.	DESCENDING.	MILES.
Level			6.49 m.
0 to 20 feet per mile.....	1.02 m.	6.43 m.	7.45
20 to 40 " "	0.6	6.2	6.8
40 to 60 " "	5.47	1.4	6.87
60 to 80 " "	13.6	3.5	17.1
80 to 100 " "	4.0	2.6	6.6
100 to 110 " "	0.9	3.0	3.9
110 to 116 " "	11.7	0.0	11.7

Total distance from La Porte to intersection, 66.91 m.

APPROXIMATE ESTIMATE OF QUANTITIES.

	CUBIC YARDS.	LINEAL FEET.	FT. BOARD M.
Earth excavations.....	1,123,290		
Solid rock excavations.....	1,076,862		
Masonry in arch culvert, pier, and abutments	5,341		
Masonry in rectangular culverts.....	3,595		
Truss bridging		400	
Timber in foundations.....			6,388 ft.

This line intersects the surveys of 1864, at Station 1460 (of the Cheyenne Pass line), west of the crossing of the Big Laramie River, and is at or near one of those points, which, in my report of last year's surveys, I regarded as fixed. The above estimate, for purposes of comparison, is given from a point (on the South Platte and Cache-la-Poudre line) equally distant from Julesberg, with Camp Walbach, on the Lodge Pole Creek, and continued to Station 1460 on the Laramie Plains, the common point of convergence of all the lines crossing the Black Hills.

Elevation amounting to 3,000 feet is overcome between La Porte and the summit of Antelope Pass. Distance, 42.8 miles; average grade, 70 feet per mile.

The character of the material is the same as that encountered in our crossing of last year from Camp Walbach, specimens of

which may be found in the office of the Company in New York.

The line separating the stratified from the primary rocks will be found on the map.

TABLE OF GRADES.—CACHE-LA-POUDRE LINE.

LA PORTE TO INTERSECTION.

ASCENDING.				DESCENDING.			
Distance, feet.	Per Station of 100 ft.	Per Mile.	Total Ascent.	Distance feet.	Per Station of 100 ft.	Per Mile.	Total Descent.
61,900	.2	116.10			2.2	116.10	
	2.0	105.60		15,900	2.0	105.60	
11,300	1.9	100.32			1.9	100.32	
6,600	1.8	95.04		12,900	1.8	95.04	
7,800	1.6	84.98		1,000	1.6	84.98	
26,600	1.5	79.20		16,100	1.5	79.20	
45,400	1.2	68.36		2,200	1.2	68.36	
20,800	1.0	52.80		3,600	1.0	52.80	
20,400	0.8	42.24		7,800	0.8	42.24	
5,500	0.5	26.40		13,600	0.5	26.40	
	0.3	15.84		19,500	0.3	15.84	
1,600	0.2	10.56		7,600	0.2	10.56	
	0.1	5.28		11,200	0.1	5.28	
	Level		3582.84	34,000	Level		1054.84

In looking over the line as run, it seemed to present the following marked characteristics: 1st. The line from either La Porte or Park Station, looking easterly, presents an uniformly smooth and favorable surface for a road bed; in this respect it is superior to any other; and 2d, on the western slope of this range, its profile is incomparably better than can be obtained on any other line crossing the Black Hills. It would seem that the only point upon which the superiority of this line could be called in question is the matter of distance, it being 54.46 miles longer than the Cheyenne Pass line, and 34.72 miles longer than the line by way of Crow-Creek.

LARAMIE PLAINS.

My instructions required such an examination to be made of the country west of Laramie River, as would demonstrate the practicability of reaching the valley of either the Tappah or Snake Rivers, by passing over the Medicine Bow Mountains, and by means of the North Park, and head waters of the North Platte, reaching the tributaries of those streams, and find a line that would be practicable south of that of 1864.

The main fork of the Laramie seemed to promise the best opening. I supposed that by following it for some distance, and then taking the first important tributary received by it, from the west draining of the Medicine Bow range, an opening might perhaps be found.

We continued the line until its direction became such as to be useless for our purpose; being east of south, which seemed to be the direction of the valley for a considerable distance in advance of our line, beyond the locality where the Medicine Bow range as a spur leaves the main Snowy Mountains. No tributary of any importance draining the Medicine Bow Mountains empties into the main fork of the Laramie.

In point of direction the left hand fork would have been better than the main stream, which our line followed, as it seemed to penetrate the Medicine Bow Mountains further. Still it did not promise sufficiently well to keep us longer; as the summer was passing away, and much yet remained to be done to the eastward.

LARAMIE CAÑON.

My instructions further required that I should make an examination of the Cañon of the Laramie in the Black Hills. As any examinations made by me could only result in a reiteration of views given in my report of 1864, I thought it advisable to delegate the matter to Mr. Case, he was therefore requested to make the reconnoissance, starting from our camp (at the Big Laramie station), accompanied by First Assistant P. J. Brown, and twenty men of our escort.

While the examination was being made the Indians were in our immediate neighborhood in force, committing depredations daily, robbing trains, murdering emigrants, burning the stations

of the Overland Stage Company, although garrisoned by troops, and so interfering with business as to make the mails very irregular and uncertain. You are respectfully referred to Mr. Case's report of this reconnoissance.

OMAHA, Neb., Jan'y 1st., 1866.

SIR,—I have the honor to report, that on the 31st of July, under your instructions, I left Camp 42, at Laramie Station, and proceeded on a reconnoissance of the Laramie Cañon. Messrs. P. T. Brown, F. S. Hodges and Frank Winship were detailed from your party, and 22 men forming an escort, (Co. "C" 1st Neb. Cal.) in command of Sergt. Winkerman, to accompany me.

We camped the first night on the right bank of the Laramie River, about five miles below your crossing of last year, having travelled about 15 miles.

August 1st.—We steered our course for a low gap in the mountains, where we felt sure of finding the head of the cañon. This place we reached about 3 P. M., or so near it, that we discovered our mistake. I have little doubt, that at some time it has been one of the outlets to the great inland lake, the bottom of which is now known as the Laramie Plains. The mountains are low at this point, as they are all the way from it, northward to the present outlet of the river.

After discovering our error, we turned our course to about N. 70 W., and kept this direction until we came very unexpectedly upon a beautiful fresh water lake, nearly circular, about 2 miles in diameter, with white sand beach, upon which beat a miniature surf. Having seen no fresh water for many miles, and our route for nearly the entire day having been over a "Sage brush desert," the sight of this beautiful lake was very gratifying to man and beast. We camped upon its banks.

August 2d.—We continued our march in a northerly direction, within sight of the river, and upon the Eastern side until we came to the nearest available camping place to the head of the Cañon, where we went into camp.

August 3d.—Leaving the escort, except three men who volunteered to accompany us, at the head of the Cañon, we started down the river on foot, and continued our wearisome march until 3 P. M.—part of the time along the narrow valley of the river; then climbing over projecting points, two or three hundred feet high, now wading around projecting rocks and oftener clambering along their almost perpendicular face.

The distance we travelled, I estimated at 15 miles, or 20 by the winding of the river. The whole of this distance, excepting one-half mile, I saw

the river and valley. It is a narrow crooked valley ; but in no place that we saw the river was it in a close cañon. In my opinion, a practical railroad line could be obtained, as far as our exploration extended ; but the bridging and tunnelling through projecting points would be expensive. I should think there would be an average of 4 bridges of 150 feet span per mile. A bridge of 100 feet span would pass the water, if crossed at right angles ; the tunnels would in most cases not exceed 300 feet in length ; one would be from 800 to 1,000 feet in length. There is no evidence that the water ever rises six feet above the ordinary stage. At our camp, of Aug. 3d, the walls of the cañon are 250 feet apart, and rising, say 100, feet at a slope of 1 to 5. On the bank of the river, and standing not two feet above the ordinary stage of water, are luxurious pine trees, 30 inches in diameter, with the bark upon them unmarred or bruised by floating ice and drift wood. I should think the stream fell for the first ten miles 50 feet to the mile, and at the rate of 80 feet per mile, the balance of the distance.

I was disappointed in the general character of the Cañon. The depression in the mountains is very rough cut, laterly with deep gorges ; the mountains rise on either side ten or twelve hundred feet, in distances varying from one to two miles from the river. It is, without doubt, the lowest depression in the range, or the Laramie River would not have found it for the exit of its waters. From a high point about 13 miles from the head of the cañon we could distinctly see the Plains, and the timber upon the North Platte. I should not think the distance from this point to the outlet of the cañon over ten miles ; and not over ten miles by the windings of the river from the lowest point reached by us in our exploration.

August 4th.—It commenced raining before daylight, and continued till nearly noon. The fact of our having only seven days' rations prevented our extending our explorations further. The distance to the head of the cañon having proved to be nearly one day's march further than we had anticipated, we returned to camp at the head of the cañon, by an old trail, which followed divides nearly all the way. On our return from our elevation, we were enabled to obtain a very good idea of the general character of the whole valley.

There is little timber along the valley, except upon the margin of the river, and in the lateral gorges. Game is very scarce ; we saw some Elk and bear tracks, and occasionally a deer or antelope.

August 5th.—Started up the river, most of the way by a new route, improving the road, and shortening the distance. Made 27 miles, and encamped on right bank of Laramie.

August 6th.—Reached camp at Laramie Station, a little after noon. Saw a band of hostile Indians, said to number 150 or 200 warriors, but did not

stop to cultivate their acquaintance. We were very thankful that they did not see us on our outward march, as they would doubtless have followed us to the head of the cañon, and massacred the entire party.

On our return, we were distant, some of the way, fifteen miles, and more, from the foot of the mountains, and had a good view of the whole range between the Antelope Pass and the Laramie Cañon. From a point about 6 miles north of Antelope Pass to the break where I expected to have found the Laramie River, a distance, say, of 50 miles, the western slope is very abrupt, and is covered with stratified rocks, through which the small streams have cut deep gorges. The highest point is near the Lodge Pole Pass. About 10 miles north of this pass appears to be a gap of much lower elevation, while 10 miles further north, is a gap, lower still. The western approach to the range, for 15 miles south of the Laramie Cañon, is a very gradual rise, as compared with any point south, until you get past the stratified rocks, or near the Antelope Pass.

From the head of Laramie Cañon, the mountains have a general trend of N. 70 W., and at their foot, seems to be the most unbroken country visible in the Laramie plains, extending as far as the eye can reach.

Accompanying this report, I have the honor to submit also a sketch of the country traversed in the reconnoissance.

Respectfully submitted,

F. M. CASE.

JAMES A. EVANS,
Division Engineer.

I consider it unfortunate that Mr. Case was unable to continue his explorations further down the Cañon, as from twelve to fifteen miles of the most difficult part of it was still east of the point to which he carried the reconnoissance.

Upon the return of the balance of the party and escort who had accompanied Mr. Case to the Laramie Cañon, and immediately upon the completion of our short survey up the Laramie River, a portion of which was done while the party was divided, I proceeded to an examination of the Black Hills, between the Cache-la-Poudre route, and the Cheyenne Pass line of 1864.

Starting from Cache-la-Poudre line on the Laramie plains, we commenced running this line easterly, with the intention of making it an independent line, looking to Crow Creek as our eastern continuation, connecting finally with South Platte line,

or future survey of the Lodge Pole Creek, as might seem most advantageous.

No difficulties were met with on the western slope ; the summit was reached without difficulty. Much of the eastern slope was favorable, until the country commenced dropping off too fast, and we were finally forced to abandon the line on that side. At this time I resolved to move our transportation to Camp Walbach, and by taking up one of our abandoned lines of last year, endeavor to find a practicable line which would intersect the line last run at the summit, this was done, and the whole becomes what I shall designate as the

CROW CREEK LINE.

This line may be considered as having a common starting point at Camp Walbach, with the line of last year, and occupying the same ground as far as Station 79, or where the Cheyenne Pass line crosses the Lodge Pole Creek ; from thence it keeps to the south of it on the divide between the Lodge Pole and the waters of the Crow Creek, frequently crossing tributaries of the latter, one of which, near the summit, forms the most prominent feature of the line. It intersects the Cache-la-Poudre line at Station 2606, on the Laramie Plains ; from thence our line is common to both, to the intersection with the Cheyenne Pass line, at station 1460, near the Laramie River.

It will be discovered that the alignment of this crossing, is inferior to either of the others, a glance at the map will show that we approach very nearly the summit of Cache-la-Poudre line at Antelope Pass.

This is, in point of distance, the shortest line that can be obtained over the Black Hills, with grades less than 116 feet per mile, a condensed table of gradients will be as follows, and all will be found within the maximum :

TABLE OF GRADES.

	ASCENDING WEST.	DESCENDING WEST.	TOTAL DISTANCE.
Level.....	M.	M.	5.78 m.
0 feet to 20 feet per mile.....	1.02	6.53	7 55
20 " 40 " ".....		3 8	3 8
40 " 60 " ".....	2.86	0.3	3.16
60 " 80 " ".....	1.5	2.9	4.4
80 " 100 " ".....	4 1	0.5	4.6
100 feet to 110 feet per mile.....	2.7	3 7	6 4
110 " 116 " ".....	6.5	5.2	11.7

Total distance from Camp Walbach to intersection, 47.39.

ESTIMATE OF QUANTITIES.

	CUBIC YARDS	LINEAL FEET.	M. FEET BOARD MEASURE.
Earth excavation.....	225,900		
Solid rock excavation.....	1,017,970		
Bridge and arch culvert masonry...	4,319		
Rectangular culvert masonry.....	1,980		
Truss bridging.....		.300	
Timber in foundation.....			3,040 fl.

TABLE OF GRADES—CROW CREEK LINE—CAMP WALBACH TO INTERSECTION.

ASCENDING.				DESCENDING.			
Distance.	Grade for Station 100 feet.	Per Mile.	Total Ascent.	Distance.	Per Station.	Per Mile.	Total Descent.
34.650 feet.	2.2	116.1		27.400	2.2	116.1	
14.600 "	2.0	105.6		19.400	2.0	105.6	
11.100 "	1.9	100.32			1.9	100.32	
5.700 "	1.8	95.04		2.800	1.8	95.04	
	1.6	84.98			1.6	84.98	
5.100 "	1.5	79.20		12.800	1.5	79.20	
7.900 "	1.2	63.36		2.500	1.2	63.36	
9.800 "	1.0	52.8		3.600	1.0	52.8	
1.000 "	0.8	42.24		8.500	0.8	42.24	
	0.5	26.40		13.500	0.5	26.40	
	0.3	15.84		19.900	0.3	15.84	
1600	0.2	10.56		3.800	0.2	10.56	
	0.1	5.28		13.500	0.1	5.28	
Level.				31.050	Level.		
			1618.0				1580.0

SUMMARY.

The following tables are given for the purpose of facilitating a comparison of the different crossings of the Black Hills. It will be necessary to understand that Julesberg, on the South Platte, and at the mouth of Lodge Pole Creek, is, in the following table, taken as the starting point, and station 1460 of the Cheyenne Pass line, west of the Laramie River crossing, a common point of convergence for all the lines crossing this range of mountains.

It should be stated further, that the distance from Julesberg to Camp Walbach, along the valley of the Lodge Pole Creek, is obtained by plotting and not from actual measurement. The distance, however, cannot vary materially, as the valley is wide for the greatest part of its course, and very direct. What I consider a fair allowance has been made to compensate for bends in its course.

In obtaining quantities of excavation, &c., &c., a point has been taken on the South Platte and Cache-la-Poudre line, equally distant from Julesberg with Camp Walbach. With these few introductory remarks and the accompanying tables, the comparison, it is hoped, will be rendered easy.

TABLE OF DISTANCES.

From Julesberg to intersection near Laramie River, <i>via</i> South Platte, Cache-la-Poudre and Antelope Pass.....	237.11	miles.
From Julesberg to intersection near Laramie River, Camp Walbach and Crow Creek.....	202.39	"
From Julesberg to intersection near Laramie River, <i>via</i> Lodge Pole Creek, Camp Walbach and Cheyenne Pass.....	182.65	"

TABLE.

	Cubic yds. of Earth Excava- tion.	Cubic yds. of Solid Rock Ex- cavation.	Cubic yds. of Mason- ry in Bridges and Arch Culverts.	Cubic yds. of Mason- ry in Rec- tangular Culverts.	Lineal ft. of Truss Bridging.	Timber in Founda- tion M. B. M.	Tunnelling Feet.	Total Elevation and Depression, La Porte and Camp Walbach respectively.		Length of Maximum Grades, 110 to 116 per mile Ascending West.	Length of Maximum Grades, 110 to 116 per mile Descend- ing West.	Length of Grades above Maximum, 132 to 147, 84 per mile.		Altitude of Summit above tide.
								Elevation.	Depression.			Asc'g.	Desc'g.	
Cheyenne Pass Line. 27.65 m.....	156,630	817,764	3213	1223	300	2800	—1500— 34,000 C. Yds.	1536.8	1358.8	7.4		3.6	9.7	8660
Crow Creek Line. 47.39 m.....	225,900	1,017,970	4319	1980	300	3040		1618.0	1580.0	9.2	8.9			8424
Cache-la-Poudre line. 82.11 m.....	1,123,290	1,076,862	5341	3595	400	6388		3582.3	1054.8	12.6	3.0			8050

The quantities in the above table are obtained as follows:—on Cheyenne Pass and Crow Creek lines, from Camp Walbach to Station 1460 on Laramie Plains; on Cache-la-Poudre line, from a point east of La Porte (Station 804), equidistant from Julesburg with Camp Walbach, and to Station 1460.

Timber.—Neither on the Cache-la-Poudre nor the Crow Creek line will as large an amount of timber be found as upon the Cheyenne Pass line of last year. Near the summit of that line we find, bordering the head of Lodge Pole Creek, a dense grove of spruce pine, covering several thousand acres. The growth is so thick as to materially affect the size of the trees; still, much of it will be adapted for ties at present, and by judicious thinning may be made to furnish a large supply in the future. This body of timber is extremely convenient to the Cheyenne Pass line, as our location of last year runs parallel in the direction of its length, for a distance of three miles.

Should the Crow Creek line be adopted, this material, to be made available, would have to be hauled about five miles in an easterly, and seven miles in a westerly direction, to strike the nearest points on that line; the descent in either case would be in favor of loaded teams. The seven miles haul westerly would likewise make it available for the Cache-la-Poudre line, as it would reach a point common to it and the Crow Creek line. Aside from the body of timber above spoken of, it is believed that on either of the lines a sufficient quantity of material may be found to tie the first track and for fuel.

The left hand fork of the Laramie River penetrates the Medicine Bow Mountains by means of a wide and open valley. The slopes on both sides are well timbered, and could be rafted down this fork of the stream to where our line crosses it, during the spring and early summer months.

Coal.—No outcroppings of this mineral were seen on either of the surveys crossing the Black Hills, contiguous to the lines as traced. The Cache-la-Poudre line is nearer workable seams of coal than any other. On Boulder Creek, forty-eight miles south of La Porte, coal is mined successfully for smelting purposes, and from thence Denver is to some extent supplied. On Coal Creek, north of Denver, and distant from the South Platte fifteen miles, valuable seams of coal are found. The mineral is said to occur on the Cache-la-Poudre, east of La Porte. Of this I have no evidence but hearsay; still, there is no reason why it should not

be found, as there is a very evident similarity in the strata at the base of the mountains from Denver to the Box Elder.*

The accompanying map of "Explorations in the Black Hills," on a scale sufficiently large to present clearly the features of this, the most difficult part of the line, is respectfully submitted. I consider it desirable to incorporate for information the crossing of last year, from Camp Walbach to the common point of intersection at Station 1460 of that line.

PLATTE VALLEY.

Work on the mountains being completed, and as it seemed impossible to make any satisfactory examination of the North Fork of Platte River, without postponing all further surveys on the South Fork for the present season, which as I stated before, in the absence of instructions, I could not consider advisable, I started Mr. Browne with the bulk of the party at La Porte, to run the line easterly to the 100th meridian for the purpose of making connection with the surveys that had been pushed westerly from the Missouri River.

Here I left Mr. Brown, taking with me as many of the party as could be spared without delaying the work, my object being to place the office work in a state of forwardness, as well as to dispense with surplus men as soon as practicable.

The wisdom of the course taken is apparent from the fact that the greater part of the office work consequent upon nearly six hundred miles of explorations was completed simultaneously with the work in the field.

The line in the valley of the South Platte I shall not dwell upon; its favorable character is so well known, its features, in an engineering point of view so tame, that aside from our survey having determined the question of distance, nothing new with regard to it can be furnished.

* Since writing the above, I have ascertained that coal is mined near Cache-la-Poudre, about eight miles east of La Porte.

The descent of the valley is as follows :

1st.	50 miles from La Porte East.....	11.31 ft. per mile.
2d.	50 " " "	7.54 "
3d.	50 " " "	8.49 "
4th.	50 " " "	7.90 "
5th.	50 " " "	8.47 "
6th.	50 " " "	6.41 "

DISTANCES.

	CHEYENNE PASS.	CROW CREEK.	CACHE-LA- POUDRE.
	Miles.	Miles.	Miles.
Initial point at Omaha to 100th meridian ...	246.72	246.72	246.72
100th meridian to Julesberg.....	134.21	134.21	134.21
Julesberg to La Porte.....			170.2
" Camp Walbach.....	155.00	155.00	
Camp Walbach to Station 1460.....	27.65	47.39	
La Porte to Station 1460 (intersection).....			66.91
Station 1460 to connections of 1864, with Mr. Reed's line on Bitter Creek	228.18	228.18	228.18
From intersection with Mr. Reed to Salt Lake City, (see Mr. Reed's report of 1864,).....	232.82	232.82	232.82
Total distance from Omaha to Salt Lake City,	1024.58	1044.32	1079.04

Mr. Brown's progress with the survey was uninterrupted until he reached Alkali, a point nearly equidistant from Julesberg and Cottonwood. There an order was found requiring Captain Griffen, who commanded our escort, to remain at Alkali, to do garrison duty there. The New York troops, twenty-five in number, in command of Lieut. Collin (they had joined the party at the junction) were likewise ordered to report at Denver; thus leaving them without escort of any kind, and making it impossible for them to remain in the field. Being at Omaha at the time, I was immediately notified by Mr. Brown of the state of things, and lost no time in communicating with Major-General Dodge, who fortunately happened to be within reach by telegraph at Central City, Colorado, with Major-General Wheaton, commanding the district, and with Brigadier-General Heath, commanding the sub-district, in which the troops happened to be, when the detail was changed, and who issued the order.

I do not wish to question either the wisdom or the necessity of this change in our escort, and I refer to it here for the purpose of explaining the delay, amounting to ten days; a delay rendered the more important from my being in receipt of the following telegram:

“Copy.”

NEW YORK, Dec. 25, 1865.

JAS. A. EVANS, Div'n Eng'r:

Line must be run up Lodge Pole Creek, to connect with line through Cheyenne Pass; also, at or east of 100th meridian line, from Republican into Platte Valley, and from Platte Valley into Republican Fork, both looking westward.

(Sigd.) T. C. DURANT.

I immediately telegraphed Mr. Brown to return to Julesberg, at the mouth of Lodge Pole Creek, and there wait for escort; this he did with the party, in company with the New York troops, who were *en route* for Denver.

I did not think it either safe or prudent for the party to go up the Lodge Pole with a less escort than 70 men. Brig.-Genl. Heath had already informed me that he could not spare more than thirty, who were already on their way to join the party, having left Fort Kearney on the 2d October. The balance would have to come from Fort Laramie, distant from Julesberg 180 miles, and rendezvous there. While this arrangement was in progress, I received your permission to abandon for the present the running of the Lodge Pole line. I felt like urging the postponement for the reason that early snows had already fallen in the hills; and as the extent of the delay about escort seemed as uncertain as the continuance of good weather to do the work, it was becoming doubtful whether we could run the line, and make our much desired connection at the 100th meridian certain.

The balance of the instructions contained in the foregoing telegram could be carried out by using the party then engaged in locating the second 100 miles from Omaha West, in charge of Mr. Edwards, who were at that time nearly through their labor.

This arrangement, with the consent of Mr. Ainsworth, engineer in charge, at Omaha, was made; and I joined them at the 100th meridian, for the purpose of running one of the lines. Mr. Brown, in the mean time, taking up the line at Alkali.

The exploration made between the Platte valley and Republican Fork enables us, with the aid of notes obtained at the land office at Leavenworth, Kansas, to furnish information of the district that will be found valuable.

The line from the 100th meridian southeasterly can be greatly improved over the profile we have, by deflecting to the eastward sooner than we did. Keeping out of the valley of Deer Creek altogether, and reaching the valley of the Republican, eight or ten miles below the mouth of Deer Creek. We should have traced that line at the time, but our escort was small, taking into consideration what the red skins were doing on this very divide still further west; in addition to that, the time for which the detail was made expired on the day following the completion of the line, and it became necessary for them to report at Fort Kearney. I afterwards succeeded, through the kindness of Genl. Heath, in having them transferred to Mr. Brown, thereby strengthening his escort so as to enable him to run the other diagonal line.

I am very confident that an extremely favorable profile can be obtained from the Valley of the Republican to the Platte Valley, by leaving the valley of the former 8 or 10 miles below the mouth of Deer Creek. Keeping on the divide east and north of that stream, and intersecting the line as run on the table overlooking the Platte Valley, no streams or depressions would be encountered. The grading would be reduced to a minimum; but few structures of any kind would be required, and the gradients would be light. It must be evident that a more favorable line (crossing the divide between the Republican and Platte Rivers) can be obtained in a northwesterly than in a southwesterly direction, for the reason that the Platte has no tributaries between the mouth of Plum Creek and Fort Kearney; whereas the Republican Fork takes in frequent affluents, having deep valleys in a direction very unfavorable to any line

coming into the valley of the main stream in a southwesterly direction.

Our line from the 100th meridian easterly, connects with the surveys of the Kansas branch at the mouth of Deer Creek. They carried their survey some eight or ten miles further up the valley of the Republican. A few days before we reached their line they were compelled to leave the field for want of sufficient escort.

The valley of the Republican, compared with that of the Platte, is narrow and crooked, with frequent tributaries, making necessary a large amount of bridging.

Profiles of both lines are given; I have likewise traced on the accompanying map where, in my opinion, the lines should be.

CONCLUSION.

The hostility of the Indian tribes made it extremely difficult and dangerous exploring the country in advance of the party; the consequence was, that in some cases instrumental surveys were made where mere personal examinations would have sufficed, could such explorations have been made with safety.

There is a difficulty in conveying to others a proper idea of the amount of annoyance this contemptible race caused us. The constant vigilance required and practiced night and day; the impossibility of dividing the party; when the interests of the survey required it; the necessity for being constantly armed, and the danger of leaving the party for short distances to reconnoitre, may be enumerated as some of the inconveniences we constantly labored under. Fortunately our escort very effectually did its duty. I doubt much if the whole volunteer service could have furnished us a more careful and efficient officer than Capt. Thos. H. Griffen, First Nebraska Cavalry. There does not seem to be any probability of a better order of things existing in the future. From what I know of the Indians, an experience extending over several years, I am not disposed to place any reliance upon any treaty that may be made with them, as it would require the same military force to carry out its terms, as would be required to give them a merited chastisement for offences already committed, and such an one as would lead them

to respect the rights of others in the future. The Indians of the plains, the most annoying of any, can be considered only as outlaws, thieves, and vagabonds, having no bond of union, no power to enforce any obligations they may voluntarily enter into, and no cohesion other than that existing among thieves everywhere,—the desire for plunder.

Such has been the kindness with which they have been treated, to such an extent have their offences been overlooked, and by some palliated, that they now look upon the whites with a feeling akin to contempt. A sad state of things existing among savages, who can only be made to behave themselves through the medium of their fears.

I am of the opinion that until they are either exterminated, or so far reduced in numbers as to make their power contemptible, no safety will be found in that vast district extending from Fort Kearney to the mountains, and beyond. To do this, no civilized manner of conducting expeditions against them will be either sufficient or successful; means will have to be used that some would consider sharp and unwarranted methods of warfare.

I am confident that such means would be in the end the most merciful.

I wish to express my obligation to Messrs. Case, Brown, Dutton and O'Neil, and every member of the corps, for their very efficient assistance during the progress of the survey.

To Major-Gen'l G. M. Dodge, Major-Gen'l Wheaton, Brig. Gen'l H. H. Heath and Lieut. W. R. Bowen, A. A. A. G. at Fort Kearney, our thanks are due for valuable assistance rendered in furnishing escort and otherwise, without which we could have done nothing in the field.

Resp'y submitted,

JAS. A. EVANS,

Div. Eng'r.

TO THOMAS C. DURANT, Esq.,

Vice-Pres. U. P. R. R. Co.

No. 13 William St., New York.

The first of these is the fact that the medical profession is not a homogeneous body. There are many different types of physicians, each with his own special interests and his own methods of practice. This is true of all professions, but it is particularly true of the medical profession, where the interests of the patient and the interests of the physician are often in conflict.

The second of these is the fact that the medical profession is not a unified body. There are many different medical organizations, each with its own aims and objectives. This is true of all professions, but it is particularly true of the medical profession, where the interests of the patient and the interests of the physician are often in conflict.

The third of these is the fact that the medical profession is not a self-governing body. It is subject to the control of the state, and it is subject to the control of the public. This is true of all professions, but it is particularly true of the medical profession, where the interests of the patient and the interests of the physician are often in conflict.

The fourth of these is the fact that the medical profession is not a body of experts. It is a body of men and women, each with his own limitations and his own strengths. This is true of all professions, but it is particularly true of the medical profession, where the interests of the patient and the interests of the physician are often in conflict.

The fifth of these is the fact that the medical profession is not a body of men and women. It is a body of men and women, each with his own limitations and his own strengths. This is true of all professions, but it is particularly true of the medical profession, where the interests of the patient and the interests of the physician are often in conflict.

The sixth of these is the fact that the medical profession is not a body of men and women. It is a body of men and women, each with his own limitations and his own strengths. This is true of all professions, but it is particularly true of the medical profession, where the interests of the patient and the interests of the physician are often in conflict.

The seventh of these is the fact that the medical profession is not a body of men and women. It is a body of men and women, each with his own limitations and his own strengths. This is true of all professions, but it is particularly true of the medical profession, where the interests of the patient and the interests of the physician are often in conflict.

The eighth of these is the fact that the medical profession is not a body of men and women. It is a body of men and women, each with his own limitations and his own strengths. This is true of all professions, but it is particularly true of the medical profession, where the interests of the patient and the interests of the physician are often in conflict.

List of Maps and Profiles Accompanying this Report.

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Topographical Map of Black Hills and Laramie Plains—Scale, 2,000 feet to 1 inch.

Maps 1, 2 and 3 of Platte Valley—Scale, 1 mile to 1 inch.

Map of Platte Valley—Scale, 4 miles to 1 inch.

Profiles 1, 2 and 3 of Cache-la-Poudre line.

“ 1 to 11 inclusive, of Platte Valley.

“ of line from Camp Walbach. (Crow Creek line.)

“ 1, 2, 3, of line from 100 meridian to Republican.

“ from Platte Valley to Republican, Southwesterly.

JAMES A. EVANS,

*Div. Eng.*



## APPENDIX C.

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*Report of* SAMUEL B. REED, *Division Engineer,*  
*on Surveys made in*  
**1865.**

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### PACIFIC DIVISION.

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OMAHA, NEBRASKA, }  
April 1, 1866. }

Sir,—I have the honor to submit the following report of my explorations and surveys on the Pacific Slope of the continent, during the past season :

Early in April last I reported for duty, in Omaha, and on receipt of your letter of instructions proceeded directly to Great Salt Lake City, with two assistants, S. W. V. Schimonsky and H. Bissell. A party was organized as soon after my arrival in Salt Lake City as possible, and work commenced near the mouth of the Weber Canon. The object of this survey was to ascertain the comparative merits of the line, as surveyed in 1864, around the Sand Hills on the south side of Weber River, which extends from the base of the Wahsatch Mountains westerly six (6) miles, with a new line crossing Sand Hills at or near the base of the mountains, which would save about ten miles of road.

After starting my party on this survey, I made an extended reconnoissance of the country east of Utah Lake, to find, if possible, a practicable route over the Wahsatch Mountains to Green River *via* Spanish Fork and the Uintah.

On my arrival in the village of Spanish Fork, where I expected to obtain men and supplies for the exploration, I found the people greatly excited and troubled in consequence of recent murders committed by the Indians in the country which I was

desirous of exploring; it was only by the positive command of Ex-Gov. Brigham Young that I could get men to accompany me. I employed eleven men and an Indian guide. We were well armed and mounted, with our provisions on pack animals. It was with many misgivings that the small party started with me up the Spanish Fork Cañon. From the valley of Utah Lake to the headwaters of Spanish Fork there are no great difficulties to be encountered. I explored two affluents that empty into the Spanish Fork, from the northeast, hoping to find a low pass over the Wahsatch Mountains to the Strawberry Valley Cut. In both instances was disappointed and forced back to the main stream, which I followed up to its source in a low pass over that part of the Wahsatch Range which is west of White River. From the headwaters of Spanish Fork to White River is one mile, with gradual slope east to the river, which, at this point runs due south. The width of the valley is about one-half mile; I followed down the valley, trying to round the high mountains, which are immediately east of White River; not succeeding, I turned back and followed up a small tributary of White River, northeast three (3) miles, to the summit of the Wahsatch Mountains. The route travelled east of White River is utterly impracticable for a railroad. As far east as I could see from the summit, the mountains were very rugged, with deep crooked cañons, down which the water from melting snow rushed with frightful rapidity. From this point I could trace the valley of White River for miles to the south, which appears to widen as it extends south, and the mountains on the west of White River seem to fall off, and it may be possible to obtain a practicable route through the Wahsatch Mountains, south of Utah Lake; thence westerly through the unexplored country, south of the great desert west of Salt Lake. After finishing my observations, I followed the crest of the mountains northwesterly around the headwaters of White River to the junction of this range of mountains with the range west of said stream.

This rough mountain country is well wooded with fir pine, and in the more sheltered places with quaking asp. All the north and east sides of the mountains are still (16th June) covered with snow (within the last twenty-four hours one foot of new snow has been added to the old stock). The abundance of timber, the large quantities of unmelted snow, and the fre-

quent snow storms at this season of the year indicate a very high altitude.

After following the summit of the mountains north opposite Strawberry Valley, I descended the east slope of the mountain to said valley and travelled north fifteen (15) miles, thence over the mountains westerly to the headwaters of Hobble Creek, and down said creek to the valley of Utah Lake. You will find the line travelled indicated on the map by dotted lines.

From these explorations I am satisfied that it is impossible to find a practicable route from the valley of Utah Lake to the valley of Green River, *via* Spanish Fork, and the Uintah. By following up Spanish Fork to its source; thence down White River to or near its junction with Green River, a practicable line may be obtained to the valley of Green River at the mouth of the Uintah. This, as near as I could learn from my Indian guide, is about one hundred miles more than to go east over the mountains to the headwaters of the Uintah and down that stream to Green River.

Failing to find a practicable route over the mountains to the valley of Green River, and not having supplies to subsist my party to make the explorations down White River, I paid them off and returned to Salt Lake City, where I learned that my party had finished the survey over the sand ridge near the mouth of Weber Cañon, and had revised the line of 1864, at the head of Echo Creek, (Profiles and Maps of both are herewith submitted.)

Both are impracticable, as an examination of the Maps and Profiles will show.

After sending telegrams and letters to New York office descriptive of my explorations, I started to join my party in the survey to South Pass. Obtaining an escort at Fort Bridger, we proceeded to the vicinity of Ham's Fork, commencing the South Pass survey at Station 7461, of the survey of 1864, in the valley of Black's Fork.

After thorough explorations of the country between Ham's Fork and Green River, I run the line up the valley of Ham's Fork eight miles; thence northeasterly over the divide, twenty and one half miles to Green River, crossing said stream one mile north of the mouth of the Sandy, up the valley of the Sandy, thirty miles to the Pacific Creek; thence up the valley

of Pacific Creek, thirty-one (31) miles to South Pass, and down a small stream ten (10) miles to the valley of the Sweet Water, two hundred and seventy-seven  $\frac{35}{100}$  miles from Great Salt Lake City. I found by explorations that the line from a point seven miles up the valley of Ham's Creek, can be produced westerly to the valley of the Muddy, without going south to the valley of Black's Fork, which should be done if the South Pass line is adopted. (See Map.)

The work on that part of the line between Ham's Fork and Green River will be expensive—some heavy rock excavations are encountered—the drainage is mostly to Black's Fork. Dry water courses are frequently crossed which have been worn into the soft shaly rock, leaving sharp ridges between.

Numerous small bridges and culverts will be required to pass the water during seasons of melting snow, although at the time of the survey, there was not one drop of water to be found between Ham's Fork and Green River; stone for culverts and bridge abutments is convenient and abundant. The crossing of Green River will require an expensive bridge, eight hundred feet long; the stream flows over smooth solid rock, and at the time of the survey was eleven feet deep in the centre of the river.

From Green River valley to within three miles of the South Pass, the excavation and embankment is generally light; but very little rock excavation will be found, good stone for masonry can be obtained at all places within a short distance of the line.

East of South Pass, the country slopes gradually to the valley of the Sweet Water; but very little bridging; and light excavations and embankments are required on this portion of the line.

The altitude of South Pass is 7470 feet above tide, 66 feet above the summit of Bridger Pass, 113 feet below the grade of the tunnel at the head of Lodge Pole Creek, in the Black Hills, and 97 feet below the summit between Bear and Muddy (rivers of the Great Salt Lake Basin). From these altitudes an interesting fact is deduced, that the summit of all the Passes through which surveys have been made over the great ranges of the Rocky Mountains are very nearly the same altitude above tide-water.

From all the information I could obtain from telegraph operators and other persons who have been living several years



in the mountains, more obstructions will be encountered at and east of South Pass, from snow, than at any other place on the lines surveyed.

The Wind River Mountains, a very high, rugged east and west range, are immediately north of the Pass. On the south, the divide of the continent trends southwesterly.

The prevailing storms are from southwest to northeast. When they reach the Wind River Mountains they are deflected east, through the Pass, driving the snow through South Pass, and depositing it in immense quantities on the slope towards Sweet Water.

After completing my surveys, I started my party westward, to make a survey from Black's Fork to Green River, at the mouth of Bitter Creek, and took a part of my escort to make an exploration of the country between Sweet Water and the valley of Bitter Creek.

From the end of my survey, I travelled south twelve miles, to the summit of the low hills which bound the Sweet Water Valley:

From the summit I saw an extensive plain, extending southwest and east, without any appearance of water, except two small lakes about twelve miles southeast. To the east there were no mountains to be seen; the country indicated an open level plain to the North Platte, in the direction of Medicine Bow River. We descended the south slope of the hills, and continued south about ten (10) miles, into the plain, which was level, and destitute of vegetation, except here and there small patches of sage bush, and a very little bunch grass.

Turning westerly, we rode to the base of the mountains, about fifteen (15) miles, thence south one mile, to a Pass through which, I think, a practicable line may be obtained to the valley of the Sandy, at or near the junction of Pacific Creek with the Sandy. (See map.) This line, if practicable, will avoid the deep snows and severe storms of South Pass.

There is no doubt about finding a favorable line from the North Platte, at or near the mouth of Medicine Bow River, north of Bridger Pass, to the head-waters of Bitter Creek.

## BLACKS' FORK TO GREEN RIVER.

In making the survey of 1864, I ran the line from a point in the valley of Green River, about twenty miles above the mouth of Bitter Creek, easterly, over the high table lands, to the north branch of Bitter Creek. This line involves the crossing of a high summit, which it is advisable to avoid, if possible. The present line was commenced at Station 8201, of the survey of 1864, in the valley of Black's Fork, and runs southerly, down the valley, eight and one-half miles, with an average descending grade of  $5\frac{3}{10}$ ths feet per mile. The valley, as far as the line follows, presents no obstacles worthy of consideration. The grades and alignments are good; excavations and embankments not expensive.

At Station 450, I left the valley, and commenced ascending the divide. The grades, on the two first miles, average 39 feet per mile. From this point, the ascent to the summit—three and one-half miles—is from fifty to one hundred and sixteen feet per mile. Grading and bridging, from the summit west to Black's Fork, not expensive. As soon as the line crosses the divide, a marked change appears in the topography of the country; the slope to Green River is much more abrupt and broken by small water-courses, than on the west side of the range. The valley of Green River is narrow, and the stream winds from side to side. Where the river washes the base of the bluffs, bold escarpments rise from one to three hundred feet. The prevailing rock is carboniferous sand, and clay slate. Maximum grades, and curves of short radii, are unavoidable, from the summit to the valley of Green River. Thence, down to the mouth of Bitter Creek, the line was run on the west side of the river, which shows very heavy work. Some, on the last two miles, can be avoided by crossing Green River two miles above the present crossing.

The grading on this part of the line will be expensive; all the excavation is loose or solid rock. Expensive retaining walls may be required to protect the road bed in places in Green River Valley.

On arriving at the mouth of Bitter Creek, I did not succeed in finding Mr. Evans' line. The topography of the country

will not admit of changing my line but a few hundred feet, consequently Mr. Evans' line cannot be very far from my termination.

Closing our work here, we returned to Great Salt Lake City, where I hoped to receive instructions about the surveys west of Great Salt Lake. Owing to the continued hostilities of the Indians on the plains and in the mountains no communications could be had with you, either by telegraph or by mail. As my instructions did not authorize making the survey west of the Lake, I did not feel at liberty to involve the expense without first exhausting all reasonable means to obtain your views on the subject. Failing to receive any instructions from the East, I, by the advice of Ex-Governor Brigham Young, organized my party, and loading my teams with supplies for three and one-half months, commenced the survey at the south end of Great Salt Lake, where my survey of 1864 terminates, continuing around the south end of the Lake as near as the nature of the ground would admit, twenty miles to the north end of the mountains immediately west of Tnilla Valley. Thence southerly up Spring or Lone Rock Valley, thirty miles to a pass through Cedar Mountains, which I thought, from explorations, would be favorable for a line over the mountains to the Desert. From the base of the mountains to the summit, five and one-half miles, a very good line was obtained. On the western slope the mountains fall off too rapidly to admit of a practicable line. After I had run down on the west side of the mountains far enough to determine the impracticability of the line, I had but little water left, and could not return and run a new line around the south end of the mountains, which should be done before deciding upon a location, unless the line hereafter described crossing the Cedar Mountains nearly west of the south end of Salt Lake is adopted. By continuing the line up Spring and Lone Rock Valley around the south end of Cedar Mountains, the distance to some point on the Desert west of the mountains, common on both lines, will be increased about twelve miles, but this line would avoid all heavy grades and expensive excavation and embankment on any line over the mountains in this vicinity.

We continued the survey westerly on the Desert  $17\frac{80}{100}$  miles

from the west base of Cedar Mountains to Granite Mountain, in the Desert, where we obtained water from a brackish spring about 800 feet above the level of the plains, and one mile up the Cañon from the base of the mountains. From thence, across the remainder of the desert, extending south from the Great Desert between Cedar and Goshoot Mountains,  $23\frac{4}{10}$  miles to Redding Springs, at the east base of the Goshoot Mountains,  $126\frac{8}{10}$  miles from Great Salt Lake City. When we arrived at the Springs the men and teams were nearly exhausted with fatigue and want of water; some were suffering severely from inflamed eyes, caused by the reflection from the white incrustation of salt and alkali on the surface of the Desert.

Leaving my party and teams at the Springs, I selected two of the best horses belonging to the escort, and taking one man with me, rode over the mountains, eighteen (18) miles, to the valley of Fish Creek; thence, down the creek three miles, and camped at what proved to be the last water in the creek. A few miles above camp the stream furnishes an abundant supply of water, for irrigating purposes, and is thus used by Major Egan and a few other settlers in the valley.

Before daylight the next morning we were making our way down the creek towards the desert, expecting to find water lower down the stream, but were disappointed. From last night's camp down the creek, ten miles, the valley is about one mile wide, then for five miles, to the desert, is a close, crooked cañon. On the desert we turned easterly around the north end of the Goshoot Mountains, twenty miles; thence south, near the mountains, to camp, at Redding Springs; were in the saddle seventeen hours, without water; estimated day's ride, sixty miles. There is no appearance of water in the mountains north of Redding Springs, at this season of the year. West of Fish Creek cañon the same barren desert country continues to Clover and Ruby valleys, without vegetation or water. Finding it impossible to procure water for my party and teams, I reluctantly abandoned making the survey across the remainder of the desert, and moved camp and supplies to Ruby Valley, to find a route over the Humboldt Mountains to the Humboldt River. Commencing at the Overland Stage Station, near the south end of Ruby Valley, the line was run westerly over the mountains,

at Hastings Pass, to the head waters of the south branch of Humboldt's River, and down the valley fifteen miles. The summit of the pass is 829 feet above Ruby Valley; the distance from the base of the mountains to the summit is too short to get a line up without winding along on the spurs of the mountains, to increase the distance, which would involve a very large expense for grading and bridging; the same difficulties were encountered on the western slope of the mountains.

I returned to Ruby Valley, and ran northerly along the base of the mountains, exploring every place where there seemed to be a probability of finding a line to the Humboldt Valley. The mountains are a narrow, high range, very precipitous on the east side.

The north and east slopes of many of the highest points are covered with large fields of snow, and at the base of the mountains a great number of springs of pure fresh water burst out and flow into ponds and marshes in the centre of the valley, which has no outlet; the water is lost by absorption and evaporation.

The first place north of Hastings' Pass where I thought it advisable to try a line over the mountains, is Humboldt's Pass, about sixty miles north of Hastings.

A good line can be obtained to the summit from the east, which is 1,235 feet above the Humboldt River  $19\frac{1}{2}$  miles west of the summit, and 767 feet above the Creek at the base of the mountains five miles west of the summit, which would be 187 feet below grade, if we could run maximum descending grade from the summit to the base of the mountains; about one mile west of the summit, the small stream that flows west from the Pass enters a narrow crooked cañon four miles long, where it is impossible to build the road, if the grade of the stream would admit. The cañon is very narrow, only wide enough for the small creek to wind its way down the crooked gorge. The walls on both sides are from 50 to 200 feet high, and in many places perpendicular. A line was run down this gorge to the base of the mountains, where my levels show the creek to be two hundred feet below grade line. Returning nearly to the head of the cañon, I ran a second line crossing the deep ravines, caused by the drainage from the high mountains. We worked

around as near maximum grades as the nature of the ground would admit, bearing southerly to take advantage of the western slope, until we finally succeeded in reaching the base of the mountains. The grade from the summit west 11 miles, will be from 100 to 116 feet per mile. Curves of 500 feet radii cannot be avoided, the grading and bridging will be very expensive.

From the base of the mountains to the Humboldt River, the line passes over a uniform descending surface. The valley at this place is about 15 miles wide, with some hills and table land elevated from 25 to 100 feet above the river. Westerly down the river the valley is wide, and presents no engineering difficulties as far as explored.

For a description of the Humboldt Valley, from the mountains to the sink, about 200 miles, I refer to the following extract from a Geographical Memoir addressed to the Senate of the United States, in 1848, by Col. Fremont, June, 1848:

"The Humboldt River rises in two streams in the mountains west of the Great Salt Lake, which unite after some fifty miles, and bear westerly along the northern side of the basin. The mountains in which it rises are round and handsome in their outline, capped with snow the greater part of the year, well clothed with grass and wood, and abundant in water. The stream is a narrow line without affluents, losing by absorption and evaporation as it goes, and terminating in a marshy lake with low shores fringed with bullrushes and whitened with saline incrustations. It has a moderate current, is from two to six feet deep in the dry seasons, and probably not fordable anywhere below the junction of the fork during the time of melting snows, when both lake and river are considerably enlarged. The country through which it passes (except its immediate valley), is a dry sandy plain, without grass or arable soil, from 5,700 feet (at the forks), to (4,200 feet at the lake), above the level of the sea, winding among broken ranges of mountains and varying from few miles to twenty in width. Its own immediate valley is a rich alluvian, beautifully covered with bluegrass, herdgrass, clover and other nutritious grasses, and its course is marked through the plain by a line of yellow pine, serving for fuel.

"This river possesses qualities, which, in the progress of events, may give it both value and fame. It lies on the line of travel

to California and Oregon, and is the best route now known through the great basin, and the one travelled by emigrants. Its direction, mostly east and west, is the right course for that travel. It furnishes a level unobstructed way for nearly three hundred miles, and a continuous supply of the indispensable articles, wood, water, and grass."

Maps and reduced profiles of the surveys over Hastings and Humboldt Passes are herewith submitted.

After closing the surveys to the Humboldt river, we followed up the valley N.  $35^{\circ}$  E. magnetic, twenty-five miles, then commenced a new survey over the mountains easterly, following up a small tribute of the Humboldt four miles to the forks. One branch (the principal) comes in from the north, the other from the southeast. We continued up the south branch  $6\frac{8}{10}$  miles to the summit, with average grade of only 25 feet per mile, and no place exceeding 60. Thence southeasterly, down through Clover Valley, past the east side of Snow Water Lake; thence bearing more easterly we ran around the south end of Antelope Butte to the Desert,  $42\frac{1}{2}$  miles from the starting point in Humboldt Valley. This line, as you will observe by referring to the accompanying map and profiles, has no heavy work. The grade over the low ridge that represents the Humboldt Mountains, called *Reed's Pass*, does not in any place exceed 60 feet per mile.

I was very anxious to continue this survey easterly and connect it with my line run from the east, but could not obtain water for my party.

The country was thoroughly explored, and a line marked on the map, which will be more direct from the summit to the Desert than where we made the survey, and equally favorable. About fifty miles east of my instrumental survey, there is a low pass through the range of mountains that extends south from the east side of Thousand Spring Valley, connecting with the mountains south of the Desert. The line should be run through this pass, then there is no difficulty in obtaining a line from Great Salt Lake City to the valley of Humboldt, a distance measured and estimated of  $208\frac{8}{10}$  miles, with grades not exceeding 60 feet per mile, generally over a desert plain without vegetation, except occasionally small patches of sage brush, grease wood, and salt plant, and without fresh water on the line

west of Tuilla Valley, until we get within 35 miles of the Humboldt River.

From careful observation of the country in the vicinity of the mountains in and bordering the Desert, I am satisfied that fresh water can be obtained in the passes over Cedar Mountain, and the first range crossed west of the Desert, also at any place on the line west of that range; this will leave a distance of sixty miles without fresh water.

There is no accurate information to determine the practicability of obtaining fresh water on this portion of the line, that I can give you.

The surface of the country is mostly covered with an incrustation of salt and alkali, and the soil, as far as I could ascertain, is strongly impregnated with these minerals, and when wet is soft, and cannot be passed over with loaded wagons. When dry it is hard, and will make, when thrown up in an embankment, a fine road bed, with but little ballasting required to maintain a fine embankment in all seasons of the year.

I will here remark, that your telegrams sent from New York, August 17th, 1865, instructing me to make a survey from Salt Lake City to the east line of the State of California, were received, September 18th, while I was in the Humboldt Mountains. At that time I had not sufficient supplies to subsist my party to make the survey. The escort also were short of rations. The nearest place that I could obtain a supply of flour and bacon was Salt Lake City. The season was so far advanced that I was compelled to abandon making the survey; and after closing the work on the west side of the Desert, we returned to Spring or Lone Rock Valley, and ran a line over the Cedar Mountains about 35 miles north of the line run on my outward trip. This line is favorable for the construction of the road, from the point of the mountains east of Spring or Lone Rock Valley, west eight miles across the level Desert Valley to the east base of the mountains, thence by easy grades and straight line to the summit of the pass. The line was continued down the west slope four (4) miles, where the survey was terminated from necessity; being out of water it was impossible to continue further west.

From this place, the line should, as shown on the accompanying map, be run southwesterly around a short range of



mountains, that lie immediately west of the pass, thence across the desert, as shown on the map. Closing my work here, I returned to the point of the mountain, twelve (12) miles west of Salt Lake City, and run a line east across the level valley of the Jordan River, connecting with the line of 1864, at Station 1,927, in the northwest part of the city of Great Salt Lake.

This closes my field work.

*Summary of lines run and explorations made during the season.*

- 10.73 miles of line run from mouth of Weber cañon, over the Sandy ridge, south of the river.
- 6.00 miles at the head of Echo Cañon, revising the line of 1864.
- 22.98 miles from a point in the line of 1864, in the valley of Black's Fork, to the valley of Green River, at the mouth of Bitter Creek.
- 99.54 miles from a point on the line of 1864, in the valley of Black's Fork, via South Pass, to the Sweet Water River.
- 105.60 miles from the west end of the line of 1864, west of Great Salt Lake city, west to Redding Springs.
- 102.88 miles, in two lines over Humboldt Mountains to the valley of Humboldt River.
- 42.69 miles from the valley of Humboldt River, east of the Humboldt Mountains to the Desert.
- 22.04 miles from Spring, or Lone Rock Valley, west over Cedar Mountains, to the desert.
- 11.60 miles across the valley of Jordan River.

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424.06 Total miles of Line run.

995 miles travelled with party.

510 miles travelled, exploring Spanish Fork, and various other parts of the country, as shown on the map.

TABLE OF GRADES.

From Sweet Water Valley over South Pass, west to Great Salt Lake City.

| ASCENDING. |                 |               | DESCENDING. |                 |                |
|------------|-----------------|---------------|-------------|-----------------|----------------|
| MILES.     | GRADE PER MILE. | TOTAL ASCENT. | MILES.      | GRADE PER MILE. | TOTAL DESCENT. |
| 33.79      | Level.          |               |             |                 |                |
| 35.17      | 0 to 20 ft.     | 466.20        | 41.61       | 0 to 20 ft.     | 550.25         |
| 20.04      | 20 " 40 "       | 558.40        | 53.60       | 20 " 40 "       | 1576.30        |
| 11.78      | 40 " 60 "       | 573.90        | 30.76       | 40 " 60 "       | 1553.60        |
| 11.41      | 60 " 80 "       | 811.00        | 12.44       | 60 " 80 "       | 859.95         |
| 1.72       | 80 " 100 "      | 142.00        | 6.23        | 80 " 100 "      | 535.30         |
| 8.26       | 100 " 116 "     | 873.10        | 12.86       | 100 " 116 "     | 1415.40        |
| 122.17     |                 | 3424.60       | 157.52      |                 | 6490.80        |

From Green River, at Mouth of Bitter Creek, west to Great Salt Lake City.

| ASCENDING. |                 |               | DESCENDING. |                 |                |
|------------|-----------------|---------------|-------------|-----------------|----------------|
| MILES.     | GRADE PER MILE. | TOTAL ASCENT. | MILES.      | GRADE PER MILE. | TOTAL DESCENT. |
| 26.50      | Level.          |               |             |                 |                |
| 34.20      | 0 to 20 ft.     | 436.20        | 25.62       | 0 to 20 ft.     | 349.51         |
| 19.05      | 20 " 40 "       | 516.40        | 41.19       | 20 " 40 "       | 1222.05        |
| 7.12       | 40 " 60 "       | 356.16        | 19.00       | 40 " 60 "       | 990.98         |
| 8.90       | 60 " 80 "       | 623.78        | 9.43        | 60 " 80 "       | 659.95         |
| 1.08       | 80 " 100 "      | 100.60        | 4.68        | 80 " 100 "      | 399.10         |
| 7.76       | 100 " 116 "     | 847.00        | 9.89        | 100 " 116 "     | 107.55         |
| 104.61     |                 | 2880.14       | 109.81      |                 | 4729.14        |

From Great Salt Lake City, west across Tuilla and Lone Rock Valleys, through north Pass of Cedar Mountains to the Desert.

| ASCENDING. |                 |               | DESCENDING. |                 |                |
|------------|-----------------|---------------|-------------|-----------------|----------------|
| MILES.     | GRADE PER MILE. | TOTAL ASCENT. | MILES.      | GRADE PER MILE. | TOTAL DESCENT. |
| 17.79      | Level.          |               |             |                 |                |
| 20.96      | 0 to 20 ft.     | 173.00        | 18.99       | 0 to 20 ft.     | 136.00         |
| 4.49       | 20 " 40 "       | 132.00        | 3.44        | 20 " 40 "       | 100.00         |
| 3.54       | 40 " 60 "       | 190.00        | 0.45        | 40 " 60 "       | 23.00          |
| 1.67       | 60 " 80 "       | 110.00        | 0.95        | 60 " 80 "       | 72.00          |
| 0.42       | 80 " 100 "      | 39.00         | 0.28        | 80 " 100 "      | 28.00          |
| 0.38       | 100 " 116 "     | 40.00         | 0.72        | 100 " 116 "     | 75.00          |
| 49.25      |                 | 684.00        | 24.83       |                 | 434.00         |

From west side of Desert, west over Humboldt Mountains, to the Humboldt River.

| ASCENDING. |                 |               | DESCENDING. |                 |                |
|------------|-----------------|---------------|-------------|-----------------|----------------|
| MILES.     | GRADE PER MILE. | TOTAL ASCENT. | MILES.      | GRADE PER MILE. | TOTAL DESCENT. |
| 3.80       | Level.          |               |             |                 |                |
| 8.52       | 0 to 20 ft.     | 86.00         | 10.64       | 0 to 20 ft.     | 113.50         |
| 4.17       | 20 " 40 "       | 113.00        | 10.30       | 20 " 40 "       | 315.00         |
| 0.66       | 40 " 60 "       | 32.00         | 2.27        | 40 " 60 "       | 110.50         |
|            | 60 " 80 "       |               | 1.42        | 60 " 80 "       | 95.00          |
|            | 80 " 100 "      |               | 0.85        | 80 " 100 "      | 74.00          |
|            | 100 " 116 "     |               |             | 100 " 116 "     |                |
| 17.15      |                 | 231.00        | 25.48       |                 | 708.00         |

## APPROXIMATE ESTIMATE OF QUANTITIES.

From Green River at mouth of Bitter Creek to Great Salt Lake City,  $214\frac{42}{100}$  miles.

3,444,000 cubic yards earth excavation.  
 300,000 cubic yards rock excavation.  
 79,000 cubic yards tunnelling.  
 25,700 " 1st class masonry.  
 7,300 " 2d " "  
 240,000 feet b. md. timber in bridges.  
 13,000 pounds wrought iron.  
 25,000 " cast iron.  
 12,000 lineal feet truss bridging.

From Great Salt Lake City west, around the south end of Salt Lake, and over Cedar Mountains to the Desert,  $74\frac{8}{100}$  miles.

610,000 cubic yards earth excavation.  
 20,000 cubic yards rock excavation.  
 5,000 cubic yards 1st class masonry.  
 900 cubic yards 2d class masonry.  
 60,000 feet b. m. timber in bridges.  
 300 lineal feet truss bridges.  
 3,000 pounds wrought iron.  
 5,200 " cast iron.

From the Desert over Humboldt Mountains, *via* Reeds Pass, to the Valley of the Humboldt River,  $8\frac{60}{100}$  miles.

145,000 cubic yards earth excavation.  
 1,000 cubic yards 1st class masonry.  
 100,000 feet b. m. timber in bridges.  
 5,500 pounds wrought iron.  
 9,500 " cast iron.

From Sweet Water to Great Salt Lake City,  $279\frac{68}{100}$  miles.

4,300,000 cubic yards earth excavation.  
 150,000 cubic yards rock excavation.  
 79,000 cubic yards tunnelling.

24,000 cubic yards 1st class masonry.  
 8,000       "       2d       "       "  
 300,000 b. m. timber in bridges.  
 12,000 lineal feet truss bridges.  
 20,000 pounds wrought iron.  
 40,000       "       cast iron.

## TIMBER AND FUEL.

This is an important question and should be thoroughly investigated before deciding on a location for the road. In my report of the surveys of 1864, I described several places from which timber for ties, bridges and buildings, and coal for fuel, can be obtained.

This year's surveys have not developed any points as favorable for procuring timber and fuel. In the Wind River Mountains, twenty to thirty miles north of the South Pass line, pine, fir, and quaking asp can be obtained. It is reported by mountaineers that there is coal near the base of the mountains. I did not find it, and have not much faith in the reports.

## GREAT SALT LAKE CITY, WEST TO THE VALLEY OF THE HUMBOLDT.

On this portion of the line, timber for ties, bridges, and buildings is very scarce, and only found in limited quantities, in the first two ranges of mountains, west of Salt Lake City.

The limited quantity of timber that can be obtained here, is confined to the narrow cañons near the summit of the mountains, where it cannot be reached without great trouble and expense. I suggest and strongly recommend, that the road should be commenced and built from the West end, East to Salt Lake City. In building in this way, an inexhaustible supply of timber can be obtained from the Sierra Nevada Mountains, for building the road and for fuel. Some timber, suitable for fuel only, grows in the Humboldt and Cedar mountains. In all my explorations west of Salt Lake, I examined thoroughly for coal, but did not find any signs of that mineral.

In conclusion, I wish to advise, for the benefit of the party completing these surveys, that camels be obtained for pack-

animals. From my experience, mule and horse-teams cannot be relied upon to carry water and food enough to subsist the men and teams while making the survey across the desert. I also wish to acknowledge the many courtesies uniformly extended to me in furnishing supplies, men, and transportation for making the surveys, by Ex-Gov. Brigham Young, and all other citizens of Salt Lake City with whom I have necessarily had business relations. To Maj. Genl. Dodge, for promptly furnishing me with a requisition on the various posts under his command for escorts, and the officers in command, for cheerfully and promptly furnishing escorts when demanded. The most of the surveys, have been made in a country where the Indians were decidedly hostile; and, to constant watchfulness to guard against the attacks of the Indians, and cheerful obedience of orders by my party, my success is attributable.

I am Sir,

Very respectfully,

Your obed't serv't,

SAML. B. REED,

*Div. Eng.*

To THOMAS C. DURANT, Esq.,

*Vice-Prest. U. P. R. R. Co.,*

No. 13 William St., N. Y.

## APPENDIX D.

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### *Change of Location west of Omaha.*

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*Report of S. SEYMOUR, Consulting Engineer, on the  
Location between Omaha City and Platte Valley.*

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OFFICE OF THE UNION PACIFIC RAILROAD CO., }  
Engineer Department, 13 William St., }  
New York, Dec. 21, 1864. }

Sir,—Inasmuch as I have recommended a change in the location of a portion of the line of the Union Pacific Railroad, between Omaha City, the point on the Missouri River fixed by the President of the United States for its eastern terminus, and the Platte Valley, at the crossing of the Elkhorn River, a point about twenty-three miles, by the present line, west of Omaha; and as you have already directed the necessary surveys to be made, with a view to adopting the proposed change, I deem it proper, both on my own account, and for the vindication of the Railroad Company, in case the proposed change in the location is finally adopted, to place in your hands some of the reasons, which, after mature deliberation, have induced me to make the recommendation.

In order to a full understanding of the subject, it will be necessary, in the first place, to state some of the leading characteristics of the present line, as compared with the one proposed as a substitute. These will consist in: 1st. Location, and length of lines; 2d, Maximum grades; and 3d, Cost of construction.

#### *1st.—Location and Length of Lines.*

The proposed new line will leave the present location, at Station No. 150 from Omaha, which is at the head of the first

grade, ascending westerly; from thence it is proposed to diverge southerly, and follow down the valley of Mud Creek to its intersection with the valley of the Pappillon River; and then follow up the valley of the Pappillon to an intersection with the present line, at or near Station No. 900. It will then follow the present line, with modified grades, to Station No. 1069, when it will diverge either to the north or south, and follow down the slope of the bluffs to the valley of the Elkhorn River, and an intersection with the present route, on such a line as will be best adapted to the maximum grade ascending easterly, that may be adopted for the line between the Elkhorn and Omaha; or the grade may be changed from 79.2 to 40 feet upon the present location.

On account of the uncertainty respecting the proper location of this short portion of the line, the change in grade will be assumed, and the discussion confined to that portion of the route between Stations Nos. 150 and 900.

The accompanying sketch will serve to illustrate the changes above referred to.

As there are no surveys on file in this office, of the line down the valley of Mud Creek, it is impossible to ascertain, with precision, the exact length of this route; but from the best data at hand, it is supposed to be nine miles longer than the present located line.

#### *2d.—Maximum Grades.*

The following table of grades, prepared from the profile of the present located line, from Station No. 0, at Omaha, to Station No. 1109, near the Elkhorn, will show the maximum grades in both directions, and the total rise and fall upon the present located line:

*Table of Grades from Omaha to Elkhorn River, on the present located line.*

| Station. | Elevation of Grade. | Length of Grade. | Ascending. | Descending. | Inclination per Mile. |
|----------|---------------------|------------------|------------|-------------|-----------------------|
| 0        | 16.000              | .....            | .....      | .....       | .....                 |
| 75       | 102.250             | 7,500 ft.        | 86.250     | .....       | 60.70                 |
| 150      | 196.000             | 7,500 "          | 93.750     | .....       | 66.00                 |
| 160      | 196.000             | 1,000 "          | Level.     | Level.      | .....                 |
| 174      | 178.900             | 1,400 "          | .....      | 18.000      | 67.70                 |



| Station. | Elevation<br>of Grade. | Length<br>of Grade. | Ascending. | Descending. | Inclination<br>per Mile. |
|----------|------------------------|---------------------|------------|-------------|--------------------------|
| 177      | 178.000                | 800 ft.             | Level.     | Level.      | .....                    |
| 218      | 223.000                | 4,100 "             | 45.000     | .....       | 57.90                    |
| 222      | 223.000                | 400 "               | Level.     | Level.      | .....                    |
| 327      | 65.000                 | 10,500 "            | .....      | 158.000     | 79.45                    |
| 332      | 65.000                 | 500 "               | Level.     | Level.      | .....                    |
| 343      | 57.000                 | 1,600 "             | .....      | 8.000       | 26.40                    |
| 351      | 57.000                 | 300 "               | Level.     | Level.      | .....                    |
| 361      | 65.300                 | 1,000 "             | 8.300      | .....       | 43.80                    |
| 364      | 65.800                 | 300 "               | Level.     | Level.      | .....                    |
| 378      | 48.500                 | 1,400 "             | .....      | 16.800      | 63.36                    |
| 405      | 48.500                 | 2,700 "             | Level.     | Level.      | .....                    |
| 416      | 56.200                 | 1,100 "             | 7.700      | .....       | 36.96                    |
| 426      | 56.200                 | 1,100 "             | Level.     | Level.      | .....                    |
| 446      | 58.000                 | 2,000 "             | 1.800      | .....       | 47.52                    |
| 456      | 63.000                 | 1,000 "             | 5.000      | .....       | 26.44                    |
| 483      | 63.000                 | 2,700 "             | Level.     | Level.      | .....                    |
| 514      | 82.000                 | 3,100 "             | 19.000     | .....       | 32.36                    |
| 530      | 83.400                 | 1,600 "             | 6.400      | .....       | 21.12                    |
| 606      | 179.600                | 7,600 "             | 91.200     | .....       | 63.36                    |
| 646      | 229.600                | 4,000 "             | 50.000     | .....       | 66.00                    |
| 649      | 229.600                | 300 "               | Level.     | Level.      | .....                    |
| 670      | 203.600                | 2,100 "             | .....      | 26.000      | 65.37                    |
| 675      | 203.600                | 500 "               | Level.     | Level.      | .....                    |
| 720      | 233.000                | 4,500 "             | 29.400     | .....       | 34.50                    |
| 740      | 233.000                | 2,000 "             | 5.000      | .....       | 13.20                    |
| 766.50   | 270.000                | 2,650 "             | 32.000     | .....       | 63.76                    |
| 780      | 270.000                | 1,350 "             | Level.     | Level.      | .....                    |
| 850      | 165.000                | 7,000 "             | .....      | 105.000     | 79.20                    |
| 852      | 165.000                | 200 "               | Level.     | Level.      | .....                    |
| 865      | 180.600                | 1,300 "             | 15.600     | .....       | 63.36                    |
| 868      | 180.600                | 300 "               | Level.     | Level.      | .....                    |
| 891      | 157.600                | 2,300 "             | .....      | 23.000      | 52.80                    |
| 905      | 157.600                | 1,400 "             | Level.     | Level.      | .....                    |
| 922      | 178.000                | 1,700 "             | 20.400     | .....       | 63.36                    |
| 923      | 178.000                | 100 "               | Level.     | Level.      | .....                    |
| 933      | 168.000                | 1,000 "             | .....      | 10.000      | 52.80                    |
| 940      | 168.000                | 700 "               | Level.     | Level.      | .....                    |
| 948      | 170.000                | 800 "               | 2.000      | .....       | 13.20                    |
| 963      | 188.000                | 1,500 "             | 18.000     | .....       | 63.36                    |
| 966      | 188.000                | 300 "               | Level.     | Level.      | .....                    |
| 976      | 180.000                | 1,000 "             | .....      | 8.000       | 42.24                    |
| 983      | 180.000                | 700 "               | Level.     | Level.      | .....                    |
| 993      | 186.000                | 1,000 "             | 6.000      | .....       | 31.68                    |
| 1,009    | 200.000                | 1,600 "             | 14.000     | .....       | 46.20                    |
| 1,013    | 200.000                | 400 "               | Level.     | Level.      | .....                    |
| 1,020    | 198.000                | 700 "               | .....      | 2.000       | 15.03                    |
| 1,022    | 198.000                | 200 "               | Level.     | Level.      | .....                    |
| 1,032    | 205.000                | 1,000 "             | 7.000      | .....       | 36.96                    |
| 1,042    | 205.000                | 1,000 "             | Level.     | Level.      | .....                    |
| 1,062    | 223.000                | 2,000 "             | 18.000     | .....       | 47.52                    |
| 1,069    | 223.000                | 700 "               | Level.     | Level.      | .....                    |
| 1,109    | 163.000                | 4,000 "             | .....      | 60.000      | 79.20                    |
|          |                        |                     | 581.800    | 431.800     |                          |

This table shows, that from Station No. 150 to Station No. 1109, the maximum grades ascending easterly, are between seventy-nine and eighty feet per mile; and the maximum grades ascending westerly, are sixty-six feet per mile. The total rise and fall between Stations 0 and 1109 is  $1,016\frac{9}{10}$  feet.

The maximum grade ascending westerly, between Station No. 0 and Station No. 150 (the proposed point of divergence), is also sixty-six feet per mile. This portion of the line is now nearly graded, and it is, therefore, not proposed to change it at present; but it is assumed, that it will be changed hereafter, to correspond with the maximum grade that may be adopted in ascending the valley of the Pappillon. This question is, therefore, reserved for future consideration. With a view, however, to such a future change, it is recommended that for the present, as little money as practicable be expended in grading in the Valley of Mud Creek, between Station No. 150 and the point where a line with moderate grades in both directions would naturally leave this valley, to enter the Valley of the Missouri River.

In the absence of any profile of the proposed line down the Valley of Mud Creek, it will be necessary to assume certain ruling grades in both directions, that will be likely to come within the facts, when ascertained. From an examination of the profile of an experimental line through the Pappillon Valley, and the study given to the subject, I shall, for the purposes of this report, assume that the maximum grades upon the proposed new line, if judiciously located, will not exceed forty feet per mile, in both directions.

### *3d.—Cost of Construction.*

The estimated cost of grading, masonry, and bridging of sections 3, 4, 5, 6, 7, 8, and 9, is \$517,205; by adding one-half of Section No. 2 (west of Station No. 150), the amount would be \$538,490. The sections average one hundred stations each, making the distance covered by the above estimate, fourteen and two-tenths miles. This gives an average per mile of about \$38,000 for the present line. It is believed that the character of the profile of the new line, from Station No. 150 to Station No. 900, will be about the same as the succeeding Section No. 10,

of the present line. This section is estimated to cost \$11,980, or about \$6,000 per mile. We will, however, call it, with the proposed limit to the grades, \$10,000 per mile.

Then we have :

|                                          |           |
|------------------------------------------|-----------|
| 14.2 miles of present line, costing..... | \$538,490 |
| 23.2 " " proposed " " .....              | 232,000   |

---

|                                                                  |           |
|------------------------------------------------------------------|-----------|
| Difference of foregoing items in favor of<br>new line.....       | \$306,490 |
| Deduct nine miles of superstructure at<br>\$18,000 per mile..... | 162,000   |

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Making difference in cost of construction,  
between Station 150 and Station 900. \$144,490

This fact, however, has very little to do with the real proposition under discussion. It is merely stated in this place for the purpose of showing that the Company, in adopting the present location, and paying a comparatively large amount for *high grades*, has reversed the rule generally recommended by engineers, and adopted by railroad companies, of paying comparatively large amounts for *low grades*.

As the above difference may hereafter be appropriated to reducing the first heavy grade west of Omaha; and as a considerable amount has already been expended on the present line between Station 150 and Station 900, the aggregate cost of construction will be assumed as equal upon both lines.

The general characteristics of the two lines may therefore be briefly stated as follows :

1st. The present line affected by the change is twenty-three miles in length, and has ruling grades of eighty feet per mile, ascending easterly, and sixty-six feet per mile, ascending westerly.

2d. The proposed new line is nine miles longer than the above, and will have ruling grades of forty feet per mile, in both

directions. The total amount and minimum radius of curvature are assumed to be the same on each line.

The question to be decided is, with a due regard to all the interests concerned, which of these lines should the Company adopt?

This question necessarily involves the discussion of the value of high grades between fixed points, and a given distance, as compared with low grades between the same points, with increased distance; or, in other words, to what extent should a line of railroad, with a given or assumed traffic, be lengthened, in order to avoid certain or assumed objectionable grades.

In discussing this question, I will assume the following data:

|                                                       |        |                     |
|-------------------------------------------------------|--------|---------------------|
| Weight of engine, 30 tons, or.....                    | 60,000 | lbs.                |
| “ “ tender, fuel, and water.....                      | 40,000 | “                   |
| “ “ car, 7 tons, or.....                              | 14,000 | “                   |
| “ “ car load, 10 tons, or.....                        | 20,000 | “                   |
| Friction of engine, 10 lbs. per ton—300 lbs. }        | .....  | 420 lbs.            |
| “ “ tender, 6 “ “ “ 120 “ }                           | .....  | 102 “               |
| “ “ car, 6 “ “ “                                      | .....  | 189 “               |
| Gravity of engine and tender, for 10 feet inclination | .....  | 64 $\frac{4}{10}$ “ |
| “ “ car and load, “ “ “                               | .....  | 40,000 “            |
| Weight on driving wheels of engine, 20 tons, or...    | 40,000 | “                   |
| Adhesion, 25 p. ct., making tractive force of engine. | 10,000 | “                   |

This adhesion will be worked out by an effective pressure of 97 $\frac{2}{3}$  lbs. per square inch, with cylinders sixteen inches diameter, and twenty-four inches stroke, and with drivers five feet in diameter.

The maximum number of cars, loaded as assumed above, which this engine will move upon a level and ascending grades, will be as follows:

|                                            |                  |       |
|--------------------------------------------|------------------|-------|
| On a level.....                            | 94               | cars. |
| On a grade ascending 10 feet per mile..... | 56               | “     |
| “ “ “ 20 “ “ .....                         | 40               | “     |
| “ “ “ 30 “ “ .....                         | 30 $\frac{1}{2}$ | “     |
| “ “ “ 40 “ “ .....                         | 25               | “     |

|                                             |                        |
|---------------------------------------------|------------------------|
| On a grade ascending 50 feet per mile. .... | 20 $\frac{1}{2}$ cars. |
| " " " 60 " " .....                          | 17 "                   |
| " " " 66 " " .....                          | 16 "                   |
| " " " 70 " " .....                          | 15 "                   |
| " " " 80 " " .....                          | 13 "                   |
| " " " 90 " " .....                          | 11 $\frac{1}{2}$ "     |
| " " " 100 " " .....                         | 10 "                   |

The actual working expenses of the train will be very nearly the same per mile in each case, as the engine always works up to its full power.

The cost of transportation, exclusive of repairs to roadway, taxes, interest on outlay, etc., has been ascertained to be about sixty-two and one-half cents per mile run; we will call it sixty cents.

Assume that an engine brings down the Platte Valley to the Elkhorn, over grades, either level, or descending in an easterly direction, for several hundred miles, a train of ninety-four loaded cars. To transport this train from Elkhorn to Omaha, a distance of twenty-three miles, over grades of eighty feet per mile, the same engine could take only thirteen of these cars; and without regard to return freight, it would therefore be obliged to traverse the road seven times with a load, and return six times without a load, or a distance of two hundred and ninety-nine miles, in order to transfer the same number of cars from the Elkhorn to Omaha.

Upon this extreme supposition, and not taking into account the transportation of return freight, or the cost and maintenance of roadway, buildings, etc., a road of two hundred and ninety-nine miles in length, with level grades, would be as useful for transportation purposes, with a given amount of tonnage in one direction, as one twenty-three miles in length, with eighty feet grades, for the reason that it would cost the same to move a given amount of freight over one as the other.

It has been shown that the same engine will haul about twice the number of loaded cars over a forty feet grade that it will over an eighty feet grade.

The above mode of reasoning shows, that an engine will be obliged to traverse the present line three times in order to trans-

port a given amount of tonnage from the Elkhorn to Omaha, over grades of eighty feet per mile, when, with a grade of forty feet per mile, it would only be obliged to traverse it once, thus making an additional distance of forty-six miles, or an additional expense of \$27.60, chargeable to every train of twenty-five cars : and showing that, other things being equal, and without regard to return freight, the Company can always do the same amount of business as cheaply over a line sixty-nine miles in length, with ruling grades of forty feet per mile, as over a line twenty-three miles in length, with ruling grades of eighty feet per mile.

It has been stated that an engine that hauls twenty-five loaded cars over an ascending grade of forty feet per mile, will haul only sixteen cars over a grade ascending sixty-six feet per mile. Inasmuch, therefore, as the preponderance of tonnage over this road will probably be in a westerly direction, it may be proper to assume that the engine would be furnished with a load for every return trip ; and therefore that, as a general rule, the distance actually travelled by the engine, and chargeable to transporting a given amount of freight over the maximum grades of sixty-six and eighty feet per mile, will be only twice the distance chargeable to hauling the same tonnage over a maximum grade of forty feet per mile.

Upon this assumption, therefore, which it must be admitted is a very favorable one for the high maximum grades, the Company would be justified in adding one hundred percent, to the length of this portion of the road in order to secure a maximum of forty, instead of sixty-six, and eighty feet grades per mile. This conclusion is based upon the supposition that the cost of construction per mile, will be the same for each line, and that the tariff for freight and passengers will be the same per mile run in each case.

When, in addition to the above, it is taken into account, that in all probability the proposed line may be completed from six to twelve months earlier than the present one ; and that the most experienced railroad managers in the country agree in recommending the reduction of grades by an increase both in cost of construction and distance ; and that many railroad companies have already expended large amounts to accomplish this

result; the argument in favor of the change, in my opinion, becomes conclusive.

The discussion might be continued almost indefinitely, by assuming that future competing lines may compel a departure from the rule of fixing tariffs at certain rates per mile, and that, consequently, the cost per mile of maintenance of way, etc.,—should be taken into the account; but this contingency seems almost too remote to deserve present notice; and even were it now assumed and embodied in the argument, it is believed that it would strengthen the conclusions at which we have already arrived.

The additional wear and tear to superstructure and machinery, chargeable to high grades, together with the increased liability to accidents and delays, from dividing and making up trains, would also come legitimately within the limits of the discussion, and add greatly to the force of the argument; but it is believed that enough has already been said to enable you to arrive at correct conclusions, not only with reference to the location of the line in question, but as to the general principles that should govern the location of other portions of your road.

The Union Pacific Railroad is to be a great national thoroughfare for all time. The Government has endowed it most liberally. The people, both on the Atlantic and Pacific slopes of the continent, are anxiously waiting for its construction. The amount of its business will be limited only by its capacity; and it therefore seems of the greatest importance that all the facilities afforded by nature should be taken advantage of, both in the location and construction of the road; and that no mistake be made that will be calculated to impair its future usefulness, or disappoint the just expectations of the Government, the stockholders, or the public.

I have the honor to be,

Very respectfully, your obt. servt.,

SILAS SEYMOUR,

*Consulting Engineer.*

TO THOMAS C. DURANT, Esq.,

Vice-Pres't Union Pacific R. R. Co.

## N O T E .

The following letter was addressed to some of the most successful and experienced managers of railroads in this country :

UNION PACIFIC RAILROAD COMPANY, }  
ENGINEER DEPARTMENT, 13 William Street. }

NEW YORK, *December 24th*, 1864.

Dear Sir,—I am requested by Mr. T. C. Durant, the Vice-President and Acting Manager of the Union Pacific Railroad, to ask your opinion upon the following proposition.

The eastern terminus of the Union Pacific Railroad has been fixed by the President of the United States at Omaha City, Nebraska Territory. There is a choice of routes between Omaha and the point where the line reaches the valley of the Platte River. One of these routes is twenty-three miles in length, with maximum grades ascending westerly, of sixty-six feet per mile, and ascending easterly of seventy-nine and one-half feet per mile.

The other route is assumed to be thirty-two miles in length, with maximum grades in both directions of forty feet per mile, and will cost three hundred thousand dollars less to prepare it for the superstructure than the first-named route,

The line through the Platte Valley, for a distance of several hundred miles west of where the line enters it at the point above mentioned, will be characterized by grades not exceeding ten feet per mile, ascending westerly, and by grades either level or descending in an easterly direction.

The question upon which your opinion, as a practical and experienced manager of railroads is solicited, is, whether it will be good policy for the Company, and for the best interests of the Government and the public, to increase the length of the eastern portion of the road, nine miles, in order to attain the difference in maximum grades as above specified.

Very respectfully, your obedient servant,

S. SEYMOUR,

*Consulting Engineer U. P. R. R.*



To which the following replies have been received :

WAR DEPARTMENT, }  
Office of Director and General Manager of Military Railroads, U. S. }  
WASHINGTON, *December 27th, 1864.*

Col. SILAS SEYMOUR,  
Consulting Eng'r, U. P. R. R. :

Dear Sir,—Your communication of the 24th inst., relating to the Union Pacific Railroad is received. You request my opinion in regard to the adoption of one of two routes between Omaha City and the point where the line reaches the Platte River. One of these routes being twenty-three miles in length, with maximum grades of sixty-six feet per mile, ascending westerly, and seventy-nine and one half feet per mile, ascending easterly.

The other route is stated to be thirty-two miles in length, with maximum grades in both directions of forty feet per mile.

In answer I would state, that upon a close examination and comparison as between length of lines and grades of the same, I am clearly of the opinion, that the adoption of the longest line with ruling grades of forty feet per mile, will best subserve the interests of the Government, the public and the Railroad Company. The question being considered regardless of any difference there may be in the cost of the construction of either line, and independent of any subsidy from the Government.

I am, very respectfully,

Your obedient servant,

D. C. McCALLUM, Bt. Brig. Gen.,  
*Director and General Manager*  
M. R. R. U. S.

NEW YORK CENTRAL RAILROAD, }  
General Superintendent's Office. }

ALBANY, *December 29th, 1864.*

Dear Sir,—I am in receipt of yours of the 24th inst., requesting my opinion in regard to one of two lines to be adopted for the location of the Union Pacific Railroad between Omaha City and a point where the line reaches the Platte River. One of said routes being twenty-three miles in length, with maximum grades ascending westerly of sixty-six feet per mile, and ascending easterly seventy-nine and one half feet per mile. The

other is assumed to be thirty-two miles in length, with maximum grades in both directions of forty feet per mile.

In reply, I beg to say I have no doubt, assuming the curvatures of the two lines to be about the same, that the longest line, with grades of forty feet per mile, is clearly the one to be adopted, both for the interest of the Company and public.

Yours very truly,

C. VIBBARD,

*Gen'l Supt. N. Y. Central R. R.*

To Col. SILAS SEYMOUR,

Con. Eng'r U. P. R. R. Co.,

New York.

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NEW YORK, *December 28th, 1864.*

SILAS SEYMOUR, Esq.,

Consulting Eng'r U. P. R. R. :

Dear Sir,—In reply to yours of the 24th inst., just received, I can only answer briefly, that it will, in my opinion, be sound policy to increase the length of line in the case stated; especially if the high grades are of considerable extent either in length or number, and if, in so doing, the curvature be not very materially increased.

The portion of the line in question will, it is true, be extended about thirty-nine per cent; but it is, comparatively, a very small part of the whole road. The interest on the difference of cost, including that of the superstructure, will pay the extra running expenses of three trains each way daily on the longer line; while it may be worked easier with its forty feet grades, than the shorter line with its sixty-six and seventy-nine and a half feet grades.

The highest ascending grade upon any section or division of the road will fix a limit to the load that can be hauled *continuously* over that division; and any separation of trains into parts, for the purpose of overcoming the elevations, will invariably be attended with vexatious delays, and often with positive danger. For every one hundred tons that can be hauled up a forty feet grade, only sixty-five tons can be hauled up a sixty-six feet grade, and but fifty-four tons can be hauled up a seventy-nine and a half feet grade. Practically, for heavy freight trains, a road twenty-three miles long, ruled by grades of seventy-nine and a half feet, will be equivalent to a road of forty-three miles long, ruled by grades of forty feet. So also, a road twenty-three miles long, ruled by grades of sixty-six feet, will be equivalent to a road thirty-five and a half miles long, ruled by forty feet grades.

Light trains, say a locomotive and tender, one baggage, one mail, and four passenger cars, with their loads, will be able to ascend any of these grades, but with varying speed. The resistance on the sixty-six feet grades will be about forty-five per cent. greater than on the forty feet grades, and the resistance on seventy-nine and a half feet grades will be about sixty-eight per cent. more than on the forty feet grades.

Without going into any nice calculations, and neglecting atmospheric resistance, it may be assumed that any train that can just make a speed of twenty miles per hour on a forty feet grade will have that speed reduced to fourteen miles per hour on sixty-six feet grades, and to twelve miles per hour on seventy-nine and a half feet grades. As regards speed, then, a road twenty-three miles long, of seventy-nine and a half feet grades, will be equivalent to a road thirty-eight miles long of forty feet grades; and a road twenty-three miles long of sixty-six feet grades will be equivalent to a road thirty-three miles long of forty feet grades, and so in proportion as the lengths of these grades are to the actual length of road.

I am of the opinion, that where the locomotive is well proportioned for working out its whole adhesion, it is unsafe for a train to descend a heavy grade at much greater speed than it will ascend the same grade; and, as a rule, that speed lost on heavy up grades should not be regained on similar down grades.

On roads having a light traffic, the effects of heavy grades are not of a very formidable nature; but on a road of national importance, designed as a great thoroughfare of travel, and for the transit of immense quantities of goods and produce, it will be found, at no very distant day, that grades of eighty feet, and even sixty-six feet per mile are quite serious obstacles.

Respectfully yours, &c.,

S. S. POST,

*Civil Engineer.*

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MASTER OF TRANSPORTATION'S OFFICE, }  
BALTIMORE AND OHIO RAILROAD COMPANY, }  
BALTIMORE, January 2, 1864. }

S. SEYMOUR, Esq.,

Engineer Union Pacific R. R. Co.,

No. 13 William Street,

New York City;

Sir,—Your letter of the 24th Dec., relative to the proposed routes of your road for a short distance west of Omaha, was duly received.

It does not need much consideration at my hands, with the special experience of our company, regarding the relative advantages of level lines

as against heavy grades, to enable me to promptly answer your question.

I advise, unhesitatingly, that it is "unquestionably good policy for the company and for the best interests of the government and the public to increase the length of the eastern portion of the road nine miles, in order to attain the difference in maximum grades," as specified.

I might cite, in illustration, the fact that, between Piedmont and Grafton, on our road, we have a series of grades ranging from 90 to 116 feet to the mile, the distance being 72 miles.

From Piedmont to Martinsburg, eastwardly, the distance is 106 miles, but there is no grade exceeding 50 feet, and yet the latter-named division, though of one-third greater length, is worked at far less cost in every respect than the division embracing the heavy grades first named.

Between Piedmont and Martinsburg an engine carries with facility from 25 to 30 loaded cars, while between Piedmont and Grafton the load is from 8 to 9 cars only.

This illustration is not minutely applicable to your case, but serves in a general way to sustain the position I have assumed in this letter.

In the case stated by you, with the circumstances named, it is very clear in my mind that the longer lines and lower grades should be adopted.

Very resp'y,

Your obd't serv't,

W. P. SMITH,

*Master of Transportation.*

PITTSBURGH, FORT WAYNE AND CHICAGO }  
RAILROAD COMPANY, }  
Office of Chief Engineer. }  
PITTSBURGH, Penn., Jan. 11, 1865.

Dear Sir,—Mr. Harbaugh handed me your Report on the location of the first section of the Union Pacific Railroad from Missouri River, with a note, stating that you would like my opinion. I do not suppose you expect an analytical examination, nor have I the time at present to make such. I have read your report, and I think a careful examination would corroborate the view you reach; or would show the preference for the lighter grade, even at the expense of the increased distance. Heavy grades may be successfully encountered, but they involve more additional current expense than is usually anticipated.

Very respectfully yours,

JOHN B. JERVIS,

*Chief Engineer.*

S. SEYMOUR, Esq.,

Consulting Engineer U. P. R. R., New York.

*Letter of J. L. Williams, Government Director, on the Location Between  
Omaha City and Platte Valley.*

NEW YORK, January 2, 1865.

THOS. C. DURANT, Esq., V. President U. Pacific R. R. Co.:

Sir,—The consulting engineer, Col. Seymour, having submitted a report, dated 21st December, recommending a change of location west from Omaha, I have prepared, at your request, and now submit the following statement of the question, in its engineering and commercial aspects, based mainly upon a personal examination of the present location, made in October last, in company with Col. Seymour, Mr. Henry, and Mr. Dey, the engineer in charge.

The facts bearing upon the question may be stated as follows:

1st. The way traffic eastward from the mountains, will consist chiefly of the product of the mines, most of which will be of little weight, in proportion to value. As respects the through traffic eastward, only such articles of ocean commerce as are of great value and little weight, and which therefore can afford to pay land carriage, to save time and insurance, will be likely to come through by rail. On the other hand, the population of the extensive mining region of the mountains, will be chiefly supplied with provisions and breadstuffs, as well as with merchandise, heavy groceries and machinery, from the Missouri Valley. We may, therefore, assume the tonnage westward as at least twice as great as that going east. Until finished through to the Pacific, the difference will be far greater.

2d. Present location between Omaha and Platte Valley, at crossing of the Elkhorn, is twenty-three miles, with maximum grades, ascending westward, of 66 feet per mile, and ascending eastward, 79 2-10 feet, or say 80 feet per mile, throwing off fractions.

3d. New route between same points, as suggested by consulting engineer, following down Mud Creek to the Pappillon, and thence up its western branch, is 32 miles long, with proposed maximum grades of 40 feet per mile in both directions. The curvature is assumed to offer equal resistance on either line.

4th. The extension of the line up the Platte, from the point of intersection at the Elkhorn, will have grades ascending with the general inclination of the valley, for 200, or perhaps, 400 miles, reaching a maximum at certain points, probably, of 10 feet per mile. As the same engine, upon

this grade, will haul more than twice the load which it can bring from Omaha to the Elkhorn, even on the line of 40 feet grades, we may assume, that in the practical working of the road, whichever route be adopted, freight trains will be made up at this point, with the number of cars adapted to the grade east or west, as the case may be.

According to Col. Seymour's tables, a 30 ton engine will haul westward from the Elkhorn, on the 10 feet maximum grade, 56 loaded cars, or, in practice, say 50 cars, which will make a train quite long enough for convenient working. The cost of hauling these 50 cars over the high grades from Omaha, will be, comparatively, on the two lines, as follows :

An engine of 30 tons weight will haul over the 66 feet grades 16 cars, or over the 40 feet grades 25 cars. It will save fractional calculations, and is accurate enough for comparison, to assume three trains over the 66 feet grades, or 48 cars, as equal to two trains, or 50 cars, over the 40 feet grades. Then, supposing that the engine in each case, after delivering at the Elkhorn, the number of cars due to a Platte Valley train, goes west with its last section, without returning, it will have passed over the line of 66 feet grades, 23 miles in length, five times=115 miles run; or, over the line of 40 feet grades, 32 miles in length, three times=96 miles run. This, at \$1,00 per mile run of the engine, gives a cost of \$115 on the present location for delivering at the Elkhorn 48 cars, and a cost of \$96 for delivering at the same point 50 cars by the proposed new route, by way of Mud Creek and the Pappillon. The adoption of the longer line of 40 feet grades will, therefore, save \$19 in the cost of motive power on each 50 car loads, or, on each 500 tons of westward bound freight.

Eastward bound freight need not be brought into the calculation upon the foregoing basis. If I am right in assuming twice as much tonnage west as east, then the cars going east will be but half loaded. On the short route of 23 miles there are 80 feet maximum grades ascending eastward, over which the return engine could haul 13 loaded cars, making a gross load of 221 tons. But to equalize the cars going in both directions it must take 16 cars on each return trip. Half of these return cars, being empty, or all but half loaded, the gross load would be 192 tons. Upon this basis with the large preponderance of westward freight, the 80 feet grades on the present location will in practice impose no extra cost, so far as respects the mere cost of motive power, over what is caused by the grades of 66 feet ascending in the direction of the greater traffic.

I have not deemed it necessary to enter into the question of passenger business. Until the new Territories are fully settled it will be heavier west than east. Passenger trains, as made up at Omaha, will run up the

Platte, unbroken, and with the same engine, to the first point of change, 80 or 100 miles distant. There would be a waste in the excess of power required east of the Elkhorn even with 40 feet, and still more with 80 feet grades, over what is required on the low grades west. The exact value of this waste is difficult to estimate. Ordinarily, the short line could be run in some 15 minutes less time than the new and longer route. But in the winter season the trip would often be made in less time over the longer route.

A saving of \$19 on each 500 tons of western bound freight would give, upon the yearly traffic, when it shall have reached 300,000 tons in that direction, an annual saving of \$11,400.

There would also be a material saving in wear and tear by adopting the more level route. Grades of 60 and 80 feet per mile are very destructive to machinery, and more so in the descent than the ascent.

On the other hand there is the expense of maintaining 9 miles of cross-ties to be charged against the new line, equal to about \$2,000 per annum.

The cost of construction is considered equal—the expense of changing the first 5 or 6 miles from Omaha, running down the river, to be done at a future day, to get a 40 feet grade throughout, offsetting the estimated, saving west of the point of divergence.

It must also be stated, that the full advantage of the lower grade on the new route, will not be realized until the change alluded to in the last paragraph shall have been made. Without this change there is still near three miles of high grade, ascending westward from 61 to 66 feet per mile, to be overcome, mitigated somewhat in its inconvenience, by being at the beginning of the road, where assistant engines can at all times be in readiness.

While my statement of the question differs in form, and works out, perhaps, a smaller saving than that reached by the Consulting Engineer, I concur with him in advising the change. For a business covering only the section of high grades between Omaha and the Elkhorn, it might be a nearly balanced question, whether to increase distance 40 per cent. for the proposed reduction of grades. But connected, as this section of the road is, with the 400 miles of 10 to 15 feet grade westward, this undulating section, with its grades of 66 and 80 feet, becomes a serious evil, affecting essentially the economical and beneficial working of this great national thoroughfare. And in view of the peculiar relation of this first section of the road to the whole line this side of the mountains, I go further than the Consulting Engineer, as respects western ascents, and recommend that the Board limit its grades to 20 feet per mile ascending westward, and 40 feet per mile ascending eastward, maintaining still a lower

maximum grade ascending west than east, equalizing, as near as may be the power required to haul the outgoing and incoming trains, under the inequality of tonnage in the two directions, which, in all probability, will preponderate westward more largely than I have assumed. The Elkhorn Bluffs may require a 40 foot grade ascending eastward. But on the proposed route, by way of the Missouri, Mud Creek and Pappillon Vallies, a maximum ascending westward, as low as 20 feet, cannot materially enhance the cost of grading.

While the principle of Col. Seymour's report, to wit, an increased length of about nine miles for a reduction of grades to 40 feet throughout, may be safely adopted, yet the actual change of this location should await the more careful surveys of the new route, now in progress, that the correctness of his basis may be verified.

It should be stated that the survey of the line by which the high grade at Omaha is hereafter to be avoided, has not yet been made, nor have I passed over the ground. For the first three or four miles following the Missouri bottom, there can be nothing to prevent a grade of 20 feet. Should the narrow ridge between the river bottom and the parallel valley of Mud Creek prove too high to pass by a thorough cut, the Company when its means shall warrant, can well afford a short tunnel rather than a continued use of the three miles of 61 to 66 feet grade.

The commerce of the country, in seeking its destination through the broad and level valley of the Platte, so favorable as an inlet to the great mining region, and as a through route to the Pacific, should not be compelled to pass over the narrow belt of high undulating land, separating the Missouri Valley from the Elkhorn, encountering in this short distance a total rise and fall of over one thousand feet.

The further general remark may be made, in conclusion, that the undulating character of the country approaching the Missouri River, on both sides, forces railroad lines into the vallies, even though considerably lengthened thereby.

Very respectfully,

J. L. WILLIAMS,

*Member of Locating Committee and  
Govt. Director U. P. R. R.*



*Gen. John A. Dix to the President of the United States.*

UNION PACIFIC RAILROAD COMPANY, PRESIDENT'S OFFICE, }  
New York, May 12th, 1865. }

Sir,—I have the honor to transmit herewith, for the consideration of Your Excellency, a map showing the amended location of a portion of the route of the Union Pacific Railroad between Omaha City and the crossing of the Elkhorn River; also, a "Report of the Consulting Engineer on the location between Omaha City and the Platte Valley, dated December 21, 1864"; also, a "Letter of J. L. Williams on the location between Omaha City and Platte Valley"; also, a "Copy of the Minutes of the Proceedings of the Executive Committee and Board of Directors of the Union Pacific Railroad Company, upon the subject of a change in the location of a portion of the road between Omaha and the Platte Valley, at a regular meeting held in New York on the 3rd, 4th, 5th and 6th of January, 1865"; and to ask, in behalf of the Union Pacific Railroad Company, that your Excellency will approve of said amended location, and the abandonment of the former location, in order that said map may be filed in the Department of the Interior as an amendment to the map filed in said department under date of October 19th, 1864.

Section 14 of the Act of Congress, approved July 1st, 1862, granting government aid to this road, provides "That the said Union Pacific Railroad Company is hereby authorized and required to construct a single line of railroad and telegraph from a point on the western boundary of the State of Iowa, to be fixed by the President of the United States, upon the most direct and practicable route, to be subject to his approval, so as to form a connection with the lines of said Company at some point on the one hundredth meridian of longitude aforesaid, from the point of commencement on the western boundary of the State of Iowa, upon the same terms and conditions, in all respects, as are contained in this act for the construction of the said railroad and telegraph first mentioned."

In pursuance of the above provision, this Company, on the 19th of October, 1864, filed in the Department of the Interior, a map showing the location of the first one hundred miles of said road west of Omaha, which line or route was duly approved by the President of the United States. The work of grading between Omaha and the Elkhorn River (a distance of twenty-three miles) had been commenced early in the spring of 1864, and upwards of one hundred thousand dollars had been expended during that

year upon that portion of the line which was abandoned by the action of the Board of Directors in making the change referred to in the minutes of the proceedings of the Board.

The reasons for making the change in the location of the line are fully set forth in the report of the Consulting Engineer of the road, and in the communication of Mr. Jesse L. Williams, a Civil Engineer of large experience, and a Government Director of the road. By referring to the appendix to the Consulting Engineer's Report, your Excellency will also observe that the change was recommended by some of the most experienced and successful railroad managers in this country, not only as a matter of ultimate interest and economy to the railroad company, but as being most subservient to the interests of the Government and the public.

The Board of Directors was entirely unanimous in adopting the change, and the Government Directors were particularly urgent in pressing the matter as one of great national importance. The Secretary of the Interior was also present during the discussion of the question in the Board, and expressed himself as being decidedly favorable to the change, and informed the company that, in his opinion, the change would be approved unhesitatingly by the President of the United States.

Acting in good faith upon all these representations and assurances, and finding from actual surveys and estimates that the line or route recommended by the Consulting Engineer proved to be more favorable as to alignments, grades, and cost of construction than the data assumed in the Report recommending the change, the Company did not hesitate to abandon the work upon the old line, and to commence work upon the new one; and up to the present time, there has been expended upon this line about two hundred and fifty thousand dollars.

The grading is now so far advanced that arrangements have been made for commencing the laying of the track at Omaha on the first day of June next, and to lay continuously from fifty to seventy-five miles of track during the present season.

Your Excellency will observe that the section of the Act of Congress hereinbefore quoted contains the only authority under which this Company can construct a road between the western boundary of the State of Iowa and the one hundredth meridian of longitude; and therefore, that unless your Excellency shall approve the amended location herewith submitted, the Company will be obliged to suspend work upon the amended line at once, and resume the work upon the original line.

This will involve a delay of at least one year in the completion of the first one hundred miles of the Union Pacific Railroad, and also compel the

Company, for all time, to encounter the damage and inconvenience of overcoming the high grades upon the original line.

The law of 1862, granting government aid to this Company, specifies that "the grades and curves shall not exceed the maximum grades and curves of the Baltimore and Ohio Railroad."

The maximum grades upon the Baltimore and Ohio Railroad are one hundred and sixteen feet per mile, which, in practice, are found to be very objectionable. (See page 14, Appendix to Consulting Engineer's Report.) By adapting this maximum to the original location, (represented upon the map by the full red line,) the cost of construction would have been about the same per mile as upon the blue or amended line; but the Company did not feel justified in resorting to these extreme grades on that line, although a saving of several hundred thousand dollars would have been effected thereby; and, for the same reasons, it does not feel justified in adhering to a maximum of eighty feet per mile, when a less maximum can be attained by a slight increase in distance.

Under all these circumstances, and in view of the fact that the company is now expending about twenty-five hundred dollars per day on the amended line, I trust that your Excellency will pardon me for urging an early decision of this question.

I have the honor to remain your Excellency's obedient servant,

JOHN A. DIX,

*President Union Pacific Railroad Company.*

THE PRESIDENT OF THE UNITED STATES.

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*Secretary of the Interior to the President.*

DEPARTMENT OF THE INTERIOR,

WASHINGTON, D. C., May 19, 1865.

Sir,—I have the honor to submit for your consideration and action the communication of Hon. John A. Dix, president of the Union Pacific Railroad Company, setting forth the considerations which render desirable an amended location of said railroad near Omaha.

The permanent location of said road for one hundred miles west of Omaha was approved by President Lincoln on the 4th day of November, 1864, in the exercise of the power conferred by the 14th section of the act of Congress approved July 1, 1862. (Statutes, vol. 12, p. 496.)

The new or amended location is shown by the blue line on the accom-

panying map, between the points designated "A" and "B." It is proposed to abandon so much of the location heretofore approved as lies between said points; it is delineated by the red line.

The map transmitted with General Dix's letter; "a Report of the Consulting Engineer on the location between Omaha City and the Platte Valley, dated December 21, 1864;" and "a Letter of J. L. Williams on the location between Omaha City and Platte Valley," are herewith laid before you.

The new location lengthens the line of road some nine miles. It is represented that the land over which it passes is more generally level, and presents more favorable grades. The Board of Directors and the Consulting Engineer recommend the change.

All the papers emanate from the company and officers appointed by it except the letter of Jesse L. Williams, Esq., a Director on the part of the United States. Mr. Williams is an engineer of acknowledged qualifications and highest respect is justly due to his opinion upon such a question. His opinions are, however, founded upon facts furnished by others, and a knowledge of the existing location. He has made no personal examination of the contemplated new location.

Conceding that when the location has been made and approved it is competent to substitute another by a subsequent order, I do not feel at liberty, under existing circumstances, to recommend that the requested change of location be approved by the President.

I respectfully suggest, should you be of opinion that you are not concluded by the approval of President Lincoln, that an experienced and skilful officer of the engineer corps be detailed to make examination of both routes, and to report fully upon their relative advantages.

You will then be in possession of such facts, from a competent and disinterested source, as will enable you to act advisedly in the premises.

I am, sir, with much respect, your obedient servant,

JAMES HARLAN,

*Secretary of the Interior.*

THE PRESIDENT OF THE UNITED STATES.

*Secretary of the Interior to General Dix.*

DEPARTMENT OF THE INTERIOR,  
WASHINGTON, D. C., May 20, 1865.

Sir,—The President of the United States has received your communication of the 12th instant, together with the report, letter and map therewith transmitted, in relation to a change of the location of a portion of the line of the Union Pacific Railroad which the company requests him to approve.

I herewith enclose a copy of letter of the 19th instant, addressed to the President by this department, expressive of its views on the subject.

The President is of opinion that he is empowered, at the request of the company, to approve the abandonment of the existing location and the adoption of the contemplated or new location, to the extent described in your communication and delineated on the map, accompanying the same. He, however, instructs me to say that he sanctions the views set forth in the enclosed letter, touching the propriety of his deferring action on the subject until a thorough examination of both locations shall have been made, and a report setting forth their relative advantages submitted to him.

The Company, in view of the delay that must unavoidably occur, may prefer prosecuting the work on the present location, approved by President Lincoln on the 4th of November last.

Be pleased to inform me, at your earliest convenience, whether the Board adheres to their request for a change, as in that event no time will be lost in detailing a person to make the examination.

I am, sir, very respectfully, your obedient servant,

JAMES HARLAN,

*Secretary of the Interior.*

Hon. JOHN A. DIX,

*President Union Pacific Railroad.*

No. 13 William Street, New York.

*General Dix to the Secretary of the Interior.*

UNION PACIFIC RAILROAD COMPANY,  
President's Office, 13 William Street.

NEW YORK, May 23, 1865.

Sir,—In reply to your communication of the 20th instant, I am instructed to state that the Directors of the Union Pacific Railroad Company adhere to their request for a new location of the line of their road west of Omaha.

As was stated in my letter to the President of the 12th instant, and as was shown by the accompanying documents, the change was made by the directors as a matter of interest and economy to the Railroad Company, and also as subservient to the interests of the Government. It had the unanimous approval of the Board, including the Government Directors; and was supported by the opinions of some of the most eminent engineers in the country, and of your predecessor in office, who was present when the change was made.

The board not doubting, under these circumstances, that the amended location would be approved by the President, have gone on vigorously with the construction of the new line; six-sevenths of the grading have been completed, and all the arrangements are made to commence laying the track by the 10th of June at furthest, with the confident assurance of having from forty to fifty miles of road in running order by the 1st of August.

The Company do not deem it advisable to recommence work now on the first location, as, in the opinion of the engineers, the line could not be run without great disadvantage to the road and the Government, and serious inconvenience to the public; and if they were to abandon the line on which they are now working they could not complete the first one hundred miles of road within the time limited by the act of Congress. The directors, therefore, ask that the examinations you may deem necessary may be made as soon as possible. They are pressed from all quarters to hurry on the work, and they have made every effort to meet the public impatience. If the Government should decide against the amended location, they will have no alternative but to cross the Missouri for the present at Bellevue, completing the old line hereafter, if the Government insist on it; and in the meantime deferring to ask for Government bonds on that portion of the road.

I have the honor to be, very respectfully, yours,

JOHN A. DIX,

*President.*

Hon. JAMES HARLAN,

*Secretary of the Interior.*

*Secretary of the Interior to General Dix.*

DEPARTMENT OF THE INTERIOR,

Washington, D. C., June 5, 1865.

Sir,—The Secretary of War having, by direction of the President of the United States, detailed Lieutenant Colonel James H. Simpson, of the Engineer Corps, to inspect and examine the present location and the contemplated new location of the Union Pacific Railroad, near Omaha, Nebraska Territory, I have to request that you will, in order to enable me to give the proper instructions to Colonel Simpson, forward to me, at your earliest convenience, maps and diagrams showing the actual location of the approved line and of the proposed line, and such other information as may be useful in preparing said instructions.

I am, sir, very respectfully, your obedient servant,

JAMES HARLAN,

*Secretary of the Interior.*

Hon. JOHN A. DIX,

*President Union Pacific Railroad Company,*

13 William Street, New York City.

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*T. C. Durant to the Secretary of the Interior.*

UNION PACIFIC RAILROAD COMPANY,

President's Office, 13 William Street,

NEW YORK, June 7, 1865.

Sir,—I have to acknowledge the receipt of your letter of the 5th instant, to the President of this Company, requesting maps and diagrams; and, in accordance therewith, send a map indicating by a red line the location as first made and approved, and by a blue line the route proposed, for which the approval of the President is asked.

The case is fully presented in the letter of General Dix to the President accompanying the report of the Consulting Engineer, and the letter of J. L. Williams, Esq., Government Director, both of which reports are enclosed herewith.

The field-books, minutes of survey, profiles, and all details relative to the lines, are at the office of the Company at Omaha. Instructions will be forwarded at once to J. E. Henry, Esq., chairman of committee on location and construction, and D. H. Ainsworth, engineer in charge at Omaha, to furnish Lieutenant Colonel J. H. Simpson, of the Engineer Corps, or any other party whom you may wish to send west, a copy of maps, profiles, and all information relative to said lines, giving them access to all books,

papers or memorandas relative thereto; and to afford every facility in their power to enable Colonel Simpson fully to investigate all the facts upon which the said change of line is based.

Presuming Colonel Simpson's instructions are to make such examinations as will satisfy the President and the honorable Secretary that the representations of the Company are correct, and the facts upon which the change of line has been made actually exist; and that it is not intended that he should open the question of the eastern terminus of the road, the Company have given no instruction relative to furnishing data upon that point, but will do so at once, if it is your pleasure.

The Consulting Engineer will accompany Colonel Simpson, or meet him at Omaha, upon a suggestion from the Department that it is desirable for him to do so.

Thanking you for the prompt manner in which this emergency has been met; and fully convinced that it is your desire to avoid all unnecessary delay,

I am, sir, yours most respectfully,

THOS. C. DURANT,  
*Vice-President.*

HON. JAS. HARLAN,  
*Secretary of the Interior.*

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*S. Seymour to General Dix.*

REPORT of Examination of Routes west of Omaha, with Col.  
SIMPSON and Mr. HARBAUGH.

UNION PACIFIC RAILROAD COMPANY,  
Engineer Department, 13 William Street, }  
New York, *July 24th, 1863.* }

Sir,—In accordance with instructions received from Mr. T. C. Durant, Vice-President, based upon the request of the Government Directors of the Union Pacific Railroad Company, that I should visit Omaha, N. T., and accompany Lieutenant-Colonel J. H. Simpson, United States Engineer, in his examination of the two routes between that city and the Platte Valley, preparatory to his reporting to the Secretary of the Interior, upon the expediency of the change of location proposed by the Railroad Company, I have the honor to



## REPORT:

That I left New York on the evening of June 28th, travelling by the way of Harrisburg, Pittsburg, Chicago, Rock Island and Des Moines, and arrived at Omaha on the morning of the 4th July instant. Col. Simpson and Hon. Springer Harbaugh, Government Director, arrived there in the afternoon of the same day. The evening was spent in the examination of maps, profiles, etc., in the railroad office.

On the morning of the 5th July, the party, consisting of Lieut.-Colonel Simpson, U S. Engineers, Mr. Harbaugh, Government Director; Mr. Henry, Chief Constructing Engineer; Mr. Ainsworth, Engineer in charge; Mr. Van Tuyl, Land Agent, and myself, started from Omaha, and followed the line as now being constructed by the Company, *via* the Mud Creek and Pappillon Valley route, to the village of Fremont in the Platte Valley, a distance, by this route, of  $47\frac{3}{4}$  miles from Omaha.

On the 6th we returned to Omaha *via* the line as originally located, but subsequently abandoned by the Company, a distance by this route of 39 miles.

On the morning of the 7th we examined the flats of the Missouri River, in the vicinity of Omaha, with reference to their safety and eligibility as connected with the location and construction of the necessary Depot buildings and shops required at the eastern terminus of the road. In the afternoon, we drove along the dividing ridge or bluffs, between Mud Creek and the Missouri River to Bellevue, which is situated on the point, or table land at the confluence of the Vallies of the Pappillon and Missouri Rivers, a distance of about ten miles below Omaha. During this reconnoissance, Col. Simpson, Mr. Harbaugh, Mr. Ainsworth and myself, agreed upon the point of greatest depression in the bluffs, through which the line proposed for the maximum grade of forty feet per mile, should be run between Omaha and a point on the present line (say Station 400), situated about two miles easterly from the point (Station 542) where the present line crosses the main Pappillon, and enters the Valley of Mud Creek. Colonel Simpson expressed a desire that this route should be carefully surveyed and estimated; and under the authority received from Mr. Durant by telegraph, Mr. Ainsworth made arrangements to run a preliminary line through the pass, or depression in the bluffs, as soon as practicable.

The 8th being Saturday, Colonel Simpson expressed a desire to remain at Omaha, for the purpose of writing some letters, and hearing the views of the most prominent citizens and business men of the city, with reference to the proposed change in the location of the road. Mr. Peter A. Dey, the former Engineer in charge, at Omaha, was found to be very zealous in advocating the line as originally located by him, with maximum grades of

eighty feet per mile. He informed me that he was employed by Mr. Saunders, the Governor of the Territory.

Monday, the 10th, was quite stormy, and we remained at Omaha, making further examinations of the maps, profiles and estimates in the railroad office.

On the morning of the 11th, Colonel Simpson and myself examined the country along the bluffs, for some miles immediately west of Omaha, for the purpose of satisfying ourselves that the line as now located and graded up the Valley of Omaha Creek, from Station 0 to Station 150, was the only practicable route for a line perpendicular to the river, involving a maximum grade as low as sixty-six feet per mile; and that the only practicable method of reducing the grade to forty feet per mile upon this portion of the line, was to follow down the Missouri River to the notch or pass examined on the afternoon of the 7th. Mr. Harbaugh spent the morning of the 11th in riding about the country with Mr. Dey, prospecting for coal, etc. In the afternoon Colonel Simpson, Mr. Harbaugh and myself drove down the Missouri Valley, along the foot of the bluffs, to the pass being examined by Mr. Ainsworth. We remained at the pass until Mr. Ainsworth had carried his experimental line from Station 366 of the present line in the Valley of Mud Creek, over the Summit, and several stations down the descent towards the Missouri River. On examining the profile, we became fully satisfied of the practicability of the route, with a maximum grade of forty feet per mile ascending easterly, and from twenty to forty feet per mile, ascending westerly from Omaha, and involving a cut of not exceeding forty feet in depth, for a very short distance at the summit.

About this time I became satisfied from an examination of the maps and profiles in the office at Omaha, that much of the information required by Colonel Simpson could not be furnished there; and I therefore addressed him a letter, asking him to defer his conclusions and report, until we could return to New York, and I would then place in his hands this information, together with some additional arguments in favor of the new route.

He at once, and very cheerfully assented to this arrangement, and immediately telegraphed the Secretary of the Interior for authority to comply with my request. The line of telegraph, however, being down, it was some days before he received a favorable reply, which he deemed necessary before giving me an official answer.

Colonel Simpson having intimated a desire to examine the Missouri Valley as high up as De Soto, a point some 22 miles above Omaha, and nearly opposite the confluence of the valleys of the Boyer and Missouri Rivers, at which point it has been suggested that the Cedar Rapids Railroad

will cross the latter river, and proceed thence westerly, to an intersection with the Union Pacific Railroad, at the north bend of the Platte River, near the town of Fremont; and having arranged with Mr. Ainsworth to meet us with his party on the morning of the 13th, at or near the crossing of the Elkhorn River, for the purpose of making some examinations with reference to the reduction of the 80 feet grade near that point; Colonel Simpson, Mr. Harbaugh and myself started from Omaha on the morning of the 12th, and drove up the Missouri Valley to, and about three miles above De Soto, thence across the country in the direction of Fontenelle, to a point about north from Elkhorn City; and thence to the latter place, where we remained over night. Our observations confirmed the information already in your possession, to the effect that the route would be found both cheap, direct and favorable for low grades; and also that a saving of at least 35 miles would be effected by the Cedar Rapids Company, in making the connection over this route, rather than by way of Omaha.

We reached the vicinity of Kane's Cut, near the Elkhorn, on the morning of the 13th, where we found Mr. Ainsworth running an experimental line from the head of the Pappillon, into the Elkhorn Valley, at a point about one half mile north of where the present line leaves the bluffs.

The result of the examination, both at this point and on the ground of the present location, satisfied us that an engineering mistake had been committed in the location of the line in this vicinity; and that a line, with a maximum grade ascending easterly, of at most 40 feet, and probably as low as 20 or 30 feet per mile, might have been procured at very much less cost, and very little, if any increase in distance over the present line. The work upon the present location, however, had progressed so far, and the foundation masonry for the bridge across the Elkhorn having been nearly completed, it was concluded that under all the circumstances it would be most expedient for the Company to reduce the grade in that locality from 80 to 40 feet per mile, by deepening the cut and raising the embankment upon the present line, after the grading shall have been completed, and the track laid, so as to admit of doing the work with an engine and gravel cars.

From this point we returned to Omaha, where Colonel Simpson found a favorable reply from the Secretary of the Interior, to his despatch, and gave me an official reply to my letter of the 10th.

On the morning of the 14th Colonel Simpson, Mr. Harbaugh and myself drove over to Council Bluffs, (which is situated on the east side of the Missouri Valley, and nearly opposite Omaha), for the purpose of examining the line of bluffs upon the east side of the Missouri Valley, in order to

ascertain the most natural route for the Mississippi and Missouri Railroad to enter the valley from the east. We concluded that the valley of Mosquito Creek would most naturally be the route finally selected. This valley breaks through the bluffs into the Missouri Valley at a point about midway between the village of Council Bluffs and the town of Bellevue, on the opposite side of the river.

On learning of our arrival in town, the business men of Council Bluffs appointed a committee of three to wait upon us, and invite us to attend a public meeting at three o'clock, P. M., in the Council Chamber, which was accepted at once. The meeting was numerously attended; and the feeling evinced seemed to be unanimously in favor of the adoption of the original location, for the reason, as publicly expressed, that the new location ran so near Bellevue, that if adopted, the terminus of the road would ultimately be fixed at that point.

Colonel Simpson, in a few well chosen remarks, explained to them that he had been sent by the President of the United States to examine the whole question, and give an unprejudiced opinion upon the subject, which he should most certainly do, without fear or favor from any one.

Mr. Harbaugh and myself explained to the meeting that the question of change in the terminus of the road had never been broached in the Board of Directors, nor alluded to in the arguments which had been presented to the Company in favor of the longer route, with low grades; and that the only object the Company had in view was to reach the terminal point fixed under the law, by the President of the United States, by the most eligible and practicable route, in order to avoid any future necessity for a change; and also to afford connecting roads from the east, a favorable opportunity for making a proper business connection with the Union Pacific Railroad.

Resolutions were passed unanimously, thanking us for our visit, and tendering us the hospitalities of the town; also favoring the route as originally located—copies of which, when printed, were to have been sent to this office.

On returning to Omaha in the evening, Colonel Simpson informed me that he did not desire to make any further examination in the field; and that he was prepared to leave for New York at once, for the purpose of receiving the requisite additional information; but, as Mr. Ainsworth would necessarily be occupied several days in completing the surveys, he would remain with his family at Buffalo, N. Y., until he should hear from me upon the subject. I therefore prepared a letter to Mr. Ainsworth enclosing a copy of Colonel Simpson's letter of the 14th and recap-

itulating the nature and extent of the surveys, maps, profiles and estimates to be made by him, and either forwarded, or brought by him to this office.

We left Omaha by steamer, for St. Joseph, on the morning of the 15th instant, and arrived there on the afternoon of the 16th. While waiting at St. Joseph for the cars of the Hannibal and St. Joseph Railroad, Colonel Simpson handed me a note, giving me his address in Buffalo, and also suggesting that Mr. Ainsworth, after completing the surveys, had better come immediately to New York, bringing with him all the maps, profiles, estimates, etc.

We reached Macon City on the morning of the 17th, where I left Mr. Harbaugh and Colonel Simpson to pursue their return to Pittsburgh and Buffalo, by way of Chicago, while I took the North Missouri Railroad to St. Louis, and from thence the Ohio and Mississippi, Atlantic and Great Western, and Erie Railways, to New York, arriving here about one o'clock, P. M., on the 21st instant.

I have been thus particular, and I fear somewhat tedious, in describing the nature and extent of the reconnoissance made by Colonel Simpson, in order that you may see that it covered all the country, the natural features or topography of which could have either a direct or remote influence in the proper determination of the question to be reported upon by him.

It will not be expected that I will give any opinion as to the conclusions at which Colonel Simpson will probably arrive, after a full and careful investigation of all the data to be submitted to him. I can, however, say with great confidence, that I believe him to be fully determined to understand the whole subject in all its bearings upon the interests of the Government, the public, and the Railroad Company, before making his report; and that his report, when made, will fully justify and confirm the high reputation for professional ability and integrity which he has always sustained.

It is my purpose, if it shall meet with your approval, to prepare and submit to Colonel Simpson, in behalf of the Railroad Company:

1st. A map of the country, bounded on the south by the mouth of the Platte River; on the north by the village of De Soto; on the east by a line running, say twenty miles, easterly of the Missouri River; and on the west by the village of Frémont. On this map will be accurately traced all the different lines surveyed for the Union Pacific Railroad, and also the westerly portion of the lines proposed through the State of Iowa for the Cedar Rapids, the Mississippi and Missouri, and Burlington and Missouri River Railroads.

2d. Profiles of the different lines surveyed for the Union Pacific Railroad, between the Missouri River and Frémout.

3d. Estimates of the cost of so many of these different lines, as may be necessary to institute a proper comparison between them, based upon the highest maximum grade allowed by the charter, and the lowest maximum grades attainable in both directions at reasonable cost of construction.

4th. An additional argument in favor of the abandonment of the original location, and the adoption of the Pappillon Valley route, based upon the assumption that if the original location is adhered to, the Company, in view of its certain future abandonment, will complete the portion now unfinished, with maximum grades of 116 feet per mile; and that the Pappillon Valley route can hereafter be extended to the Missouri River, in the vicinity of Bellevue, with maximum grades ascending westerly, of 20 feet per mile, and ascending easterly, of 40 feet per mile. And that the same route can be extended to Omaha (*via* the route now being surveyed by Mr. Ainsworth), with maximum grades not exceeding 40 feet per mile in each direction.

5th. A further argument in favor of the Pappillon Valley route, based upon considerations affecting the final location and construction of the three great railroad lines through the State of Iowa; showing their probable points of crossing the Missouri River, and the routes by which they will most naturally connect with the Union Pacific Railroad—and thus showing the great national and commercial importance of so locating and constructing this road in the first instance, that no change will hereafter be necessary in order to properly accommodate connecting lines from the east; and that no unnecessary tax or burthen should be imposed for all time upon the national traffic of the Union Pacific Railroad, in order to accommodate the local and selfish views of individuals and communities.

The examination of this whole subject, while in company with Colonel Simpson and Mr. Harbaugh, has fully confirmed the opinions entertained when I submitted the report of the 21st December, 1864, in which the change of location was recommended to the Company; and the facts then assumed as the basis of the argument, have been more than sustained by subsequent examination and surveys. I feel justified, therefore, in recommending the Company to continue the work of construction upon the present line, and to adhere to the policy of changing the location as then recommended, and subsequently approved by the Company, and fully endorsed by the Government Directors and the then Secretary of the Interior.

It is only unfortunate, that a change in the administration of the Gov-

ernment has opened the question to an investigation and discussion which has already resulted in delay to the work, and an unnecessary expenditure of money on the part of the Company; and that will most likely eventuate in disappointment, if not serious injury to the localities which, if no opposition had been made by them to the change, would in all probability have derived permanent benefit from the construction of the road and its appendages.

If compelled hereafter, by the decision of the President, to construct the road upon the original location, I would recommend that it be done in the cheapest manner consistent with the requirements of the charter, and at a time when its construction will not interfere with the progress of the work up the Platte Valley, for the reason that when completed, the inexorable laws of gravity and trade will certainly compel its abandonment; and for the additional reason that to attempt to do it now, before laying the track westward, would delay the completion of the first 100 miles at least one year.

The examination also convinced me that it will be bad policy for the Company to construct depot buildings and shops of a permanent character on the flats of the Missouri River, near Omaha, for the reason that they frequently overflow to the depth of from two to five feet; and the present indications are, that the entire flat on the Nebraska side of the river, at that point, will very soon be washed away to the bluffs. But if this were not so, and the ground was in every respect favorable, I would still recommend, under existing circumstances, or any others that are likely to occur, that the principal manufacturing and repair shops for the eastern end of the road be located near the north bend of the Platte, some fifty miles from the Missouri River, so that an engine would make a trip from the shop, over the higher grades to the river, and return daily. With this arrangement, the next principal shop would be located some 200 miles westward of this point, near the 100th meridian, where, in all probability, the Kansas Branch will intersect the main line. A turn-table, small engine-house, blacksmith's shop for light repairs, and the ordinary passenger and freight buildings, are, in my opinion, all that will be required for the present at Omaha; and these should be located on the second table, at a considerable distance from the river.

Although somewhat foreign to the object of my recent mission to Omaha, as well as to the subject matter of this report, I desire, in conclusion, to bear testimony to the well directed zeal and energy with which the contractors for constructing and equipping the first one hundred miles of the road west of Omaha are prosecuting their work. The grading and masonry are being executed in the most thorough and workmanlike man-

ner. The excavations and side-drains are of ample width and depth for all drainage purposes; and substantial stone structures are being built wherever it is practicable to procure the stone. The contrast between the work already done upon this line, and that which I observed in October last, upon the first 40 miles of the Kansas Branch, west of Wyandotte, is very apparent to the most casual observer. The grading and bridging have already so far advanced as to be entirely out of the way of track-layers until they shall have reached the crossing of the Loup Fork, a distance of  $92\frac{3}{4}$  miles by the new line from Omaha.

The track-laying was commenced at Omaha on the 10th instant, while we were there; and a sufficient quantity of iron, ties, spikes and chairs were on the grounds, and continually arriving, to enable them to continue with as large a force as can work to advantage, until obstructed by the winter frosts. The saw mill and burnetizing machine were just ready to commence operations on a large scale. One locomotive engine had already arrived and three others were on the way. A large number of platform cars, and material for others, were being shipped from St. Joseph, as we passed through on our return, and the castings and other materials required for turn-tables and switches were also on the way. There was scarcely a steam-boat passing up the river that was not freighted with materials of some kind to be landed at Omaha, for the construction or equipment of the Union Pacific Railroad.

The contractors are certainly fortunate in having secured the services of so able, methodical and energetic an engineer as Mr. John E. Henry to manage their affairs at Omaha—and too much credit cannot be awarded to the power that seems, almost invisibly, to control and harmonize the purchase and delivery of the necessary materials at that point from the East.

One cannot observe the systematic working of all the machinery and appliances now in operation between this city and Omaha, that are to result in the rapid completion of the first one hundred miles of this great National work, without being impressed, not only with the force and energy with which the work is being conducted, but also with the enormous expense attending the delivery of the iron, engines, cars and other heavy machinery necessary to build and equip the road. The present lines of communication are exceedingly tortuous, uncertain and expensive, and, during the greater portion of the year, the Missouri River, between St. Joseph and Omaha, is practically unnavigable for purposes of this kind.

It has occurred to me that, in view of these difficulties, it would be sound policy for either the Company or Contractors to lease, for a term of years, one of the lines of railroad now in part completed through the State



of Iowa, with a view of completing it within the next year, as may easily be done at a moderate cost, and thus avail themselves of its use in the more economical and rapid transportation of the vast amount of materials that will be required for the Union Pacific Railroad, during the time when, under ordinary circumstances, and so far as we can judge, by present appearances, all these roads will remain in an unfinished state.

In my opinion, the traffic that would pass over one of these roads (if completed within one year from this time,) during the construction of the first five or six hundred miles of the Union Pacific Railroad, would not only pay a liberal interest on its cost, but go far towards liquidating the principal. By doing this, I think that at least twenty per cent. may be saved in the cost of a large portion of the Union Pacific Railroad; and in all probability the money thus expended in the Iowa road, would, independent of other considerations, prove to be profitable as a permanent investment.

Respectfully submitted,

SILAS SEYMOUR,  
*Consulting Engineer.*

To the Hon. JOHN A. DIX,  
*President Union Pacific Railroad Company.*

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*Mr. Harbaugh to the Secretary of the Interior.*

UNION PACIFIC RAILROAD COMPANY,

President's Office, 13 William Street, }  
New York, August 26, 1865. }

Sir,—I had the honor of transmitting you a detailed report, under date of the 20th ultimo, of my recent visit along the line of operations of the Union Pacific Railroad, more particularly touching the condition, management and progress of the work. In compliance with your suggestions, contained in your letter to the Government Directors of the 10th of June, and particularly expressed in your communication to me of the 12th instant, I now beg leave to submit a supplemental report upon the location of the road between Omaha and the Platte Valley, both as heretofore established, and as now proposed to be changed by the Union Pacific Railroad Company.

At the date of my first Report, as you were advised by letter of the 15th instant, I had not all the data I desired to enable me to form correct conclusions as to the merits of the two routes, until I had an opportunity to

examine the reports of the surveys made at the request, and under the direction of Lieutenant Colonel Simpson before leaving Omaha, and which reached the office of the Company in New York only a few days since.

After a personal inspection of the road and its location, and all matters pertinent thereto, I will endeavor to give the Department an impartial and candid report, as fully as I am qualified to make, with an eye single to the interests of the entire nation which I have the honor to represent.

In accordance with the original Act of Incorporation, section 14, "the Union Pacific Railroad Company is authorized and required to construct a single line of railroad and telegraph from a point on the western boundary of the State of Iowa, to be fixed by the President of the United States, upon the most direct and practicable route, to be subject to his approval," and within a designated time; and it is further provided, in section 7 of said Act, that in fixing the point of connection of the main trunk with the eastern connections, it shall be fixed at the most practicable point for the construction of the Iowa and Missouri branches.

That point was definitely settled by President Lincoln, at Omaha City on the Missouri River. The Company designated the general route, and filed a map for the first one hundred miles in the Department of the Interior.

A contract for the construction and equipment of the first one hundred miles westward was made on the terms and conditions as set forth in the report of my colleagues to the Department of the 8th ultimo. During the month of October, 1864, Hon. J. L. Williams, at the request of the other Government Directors, visited the line of operations of the road, in company with Colonel S. Seymour, the Consulting Engineer of the Company. On their return, Colonel Seymour, in a communication to the Company, under date of December 21, 1864, strongly recommended a change in the location of a portion of the line between Omaha and the Elkhorn River, a point about twenty-three miles, by the first located line, west from the Missouri River, on the basis that the maximum grades could be reduced from eighty to forty feet per mile, ascending in an easterly direction; and from sixty-six to forty feet per mile, ascending in a westerly direction, notwithstanding it would increase the distance, as he then supposed, about nine miles. Mr. Williams, in a communication to the Company, under date of January 2, 1865, a copy of which my colleagues have furnished you with, concurred with Colonel Seymour in advising the change, on the condition that after actual surveys were made the basis assumed should hold good.

The aggregate cost of construction was assumed to be the same upon both routes. The subsequent surveys made by the Company for the location of that portion of the proposed new route, between Stations 150 and

900, fully verified the assumptions as to maximum grades; and more than verified them as to comparative distances, the length of the new route being found only 8.72 miles longer than the first location. Consequently, at a meeting of the Board of Directors last spring, the change was made, and the Directors on the part of the Government concurred therein.

I have carefully examined the maps, profile and report of survey made at the instance of Colonel Simpson, United States Engineers, for the purpose of enabling him to form correct conclusions as to the assumptions of the Company in regard to the change of location, which show results still more favorable for the proposed new route.

One of the surveys made down the valley of the Missouri river a few miles, to a deep depression in the bluffs, from thence to Station No. 421 where this survey intersects the graded road in the valley of Mud Creek, gives a line 3,590 feet shorter than the line as now graded between the same points, via Station 150, and which gives a line only 8.04 miles longer than the old or first located line between Omaha and the Valley of the Elk Horn River; and susceptible of being constructed at a moderate expense, with a maximum grade of thirty feet per mile in both directions.

I am fully convinced, after examining the surveys and estimates on file in the office of the Company, that after the track shall have been laid on the route as at present graded, which has been asked to be approved by the President of the United States, instead of the original location, the Company can, at any time hereafter, with locomotives and construction trains to assist in doing the work economically and expeditiously, reduce the maximum grades between the Missouri River at Omaha, and the Platte Valley, to thirty feet per mile in each direction, at an expenditure not exceeding \$250,000; at the same time the distance will only be increased a fraction more than eight miles over the line as originally located, with maximum grades of sixty-six feet per mile ascending westerly, and eighty feet per mile ascending easterly.

I am well satisfied that it is perfectly impracticable to bring the original location to this maximum of grade, so as to have a railroad that can be economically and safely worked.

By the action of the Company, duly authenticated by its officers, they pledge themselves to a further reduction of grade, in both directions, as soon and as speedily as the increased business of the road will require it. I have requested that a copy of this pledge be duly furnished (properly authenticated) to the Government.

I am well convinced that as soon as eastern connections are made, the volume of trade and traffic will be so great that it will be manifestly the

interest as well as the policy of the Company, to reduce grades to the lowest possible maximum for the safe and economical working of the road.

I consider it my duty to mention that surveys were made, at the request of Colonel Simpson, from the mouth of Mud Creek, down the Pappillon Valley, to the Missouri River. It is ascertained that the maximum grade can be reduced to twenty feet per mile from the Missouri River, at the point mentioned, to the Platte Valley, at the Elkhorn River; and thirty feet per mile in the contrary direction, from the Platte Valley to the Missouri River; and from the estimates on file in the office of the Company, an expenditure of \$132,800 would complete a branch from the mouth of Mud Creek to the Missouri River, and at the same time shorten the line about three miles over the proposed amended line.

Every intelligent railway manager will admit that the adoption of high gradients is an error fatal to the economical working of a railway.

Heavy gradients are generally adopted from notions of economy, want of capital, etc.; but they generally entail permanent expenses that would well pay for largely increased outlay in the beginning.

Generally, the estimated maximum of business on most of the railways in our country has been too low. My ideas and estimates of the business to be done on the Union Pacific Railroad, particularly as soon as completed to the base of the Rocky Mountains, are possibly in advance of the calculations of most persons not conversant with the present heavy overland trade and travel.

In the location of this road, the fact of a large and constantly increasing business must be kept in view. It must be considered the work of the nation, without any particular sectional or local interests, at the expense of the great majority in interest.

It is patent to all railroad managers that high gradients greatly increase the risk of accidents. It is impossible to have that control over a train on a high gradient that can be kept on a low one. Close observation convinces me that it is better to have two miles of thirty feet gradient than one mile of sixty feet gradient. I hope that Colonel Simpson will discuss the matter in his report to the department as to the workings of trains on high and low gradients, with advantages and disadvantages, and give the department such facts and calculations as a practical civil engineer conversant with such subjects only can do.

I have examined the subject of change of location of the line west from Omaha, both as heretofore established and as now proposed by the company to be changed, as fully as I am capable, for and against, present and prospective, with no interest to subserve save the government which I have the honor to represent; and would respectfully recommend a change

in the location from the one first made to the new one, which his Excellency the President of the United States has been asked to approve, and which the board of directors unanimously concurred in; and with the understanding that the Company place on file the pledge, as heretofore noted in my report, for a further reduction of grade as soon and as speedily as the business of the road will require it.

I am, sir, very respectfully, your obedient servant,

SPRINGER HARBAUGH,

*Government Director Union Pacific Railroad Company,*

HON. JAMES HARLAN,

*Secretary of the Interior.*

*S. Seymour to Col. Simpson.*

UNION PACIFIC RAILROAD COMPANY,

Engineer Department, 13 William Street, }

NEW YORK, August 29, 1865. }

Colonel,—I have the honor to place in your hands the following named data relating to the proposed change in the route of the Union Pacific Railroad between the Missouri River and the Platte Valley, to wit:

1. Communication from the Union Pacific Railroad Company, with reference to their future policy as connected with the change of route west of Omaha.

2. Report of the Consulting Engineer on the location between Omaha City and the Platte Valley, dated December 21, 1864.

3. Letter of J. L. Williams, on the location between Omaha City and the Platte Valley, dated January 2, 1865.

4. Map showing the different routes surveyed for the Union Pacific Railroad between the Missouri River and Frémont.

5. Profile showing the grades upon the different routes surveyed for the Union Pacific Railroad between the Missouri River and Frémont.

6. Estimate of cost of different routes between the Missouri River and Platte Valley, August 24, 1865, by S. Seymour, Consulting Engineer.

7. Extract from estimate of first 100 miles, 80-foot grades, September 1, 1864, by Peter A. Dey, Engineer in Charge.

8. Approximate estimate West Pappillon and Mud Creek, January 23, 1865, by J. E. House, Division Engineer.

9. Estimate of D. H. Ainsworth, Engineer in Charge, August, 1865.

10. Surface profiles of routes Nos. 1, 2, 3, 4, and 5.

The communication from the Company, with reference to their future policy as connected with the proposed change of route west of Omaha, is intended to convey the strongest assurances that can be given by the Union Pacific Railroad Company, that, in case of the approval by the President of the United States of the amendment of the route between Omaha and the Platte Valley, as submitted to him through the Secretary of the Interior, on the 12th of May, 1865, and represented upon the accompanying maps, profiles, and estimates as "Route No. 3," the Company will, within a reasonable time, adopt and carry out the improvements in maximum grades of which this route is claimed to be susceptible, as the same are represented upon the map, profiles, and estimates, by "Route No. 4."

The report of the Consulting Engineer, dated December 21, 1864, together with the letter of Hon. J. L. Williams to Mr. T. C. Durant, Vice-President of the road, dated January 2, 1865, contain the reasons which induced the Company, in January last, to abandon the route as originally located between Stations 150 and 900, and substitute for it what is called the Mud Creek and Pappillon Valley Route, between the same points.

You will observe that the case, as presented in the documents above referred to, is a suppositious one, based upon certain assumptions, which it was believed a survey of the route recommended for adoption would prove to be true. The Company, therefore, in the first instance, adopted the change upon the condition that the surveys of the new route proved the correctness of the data assumed in the argument, which being afterwards done to the satisfaction of the Company, so far as the Mud Creek and Pappillon Valley Line was concerned, the work of construction was, during the early part of last February, suspended upon the old line and commenced upon the new.

In submitting the case at the present time for your final investigation and report to the Secretary of the Interior, to whom it has been referred by the President; for the purpose of vindicating the officers of the Company from the charge of improper motives in prematurely adopting this change of route, it appears proper that I should lay before you the following brief history of the case prior to the date of my report of December 21, 1864, and the letter of Mr. Williams of January 2, 1865:

In October, 1864, I, for the first time, passed over and examined the line, as then located and being constructed under the direction of Mr. Peter A. Dey, Engineer in Charge, in company with Mr. Jesse L. Williams, Mr. John E. Henry, and Mr. Dey. In doing this, I took occasion to study the drainage and topography of the country in the immediate vicinity of this line, and to obtain from Mr. Dey what information I could respecting the surrounding country. I found that the line, as then located

crossed the head waters of Mud Creek at or near Station 170, and, on examining the map, I found that this creek ran southerly, and discharged into the Pappillon at a point four or five miles west of the Missouri River, at Bellevue.

Before leaving Omaha, I asked Mr. Dey if he had studied the topography of the country sufficiently to render it certain that the maximum grades between Omaha and the Platte Valley could not be reduced at a reasonable expense by increasing the length of the line. He replied, very positively, that he had, and that it could not be done. I then called his attention particularly to the eighty-feet grade descending westerly from the bluffs into the Platte Valley, near the Elkhorn River; and told him that I was satisfied, from my examination of the ground, that by turning the line upon the face of the bluffs, the grade at that point could be reduced to almost any limit, and the cost of grading materially reduced. He admitted that this was possible, but claimed, at the same time, that the eighty-feet grade at that point was of no importance, so long as the same grade occurred in several instances between that point and Omaha. I then asked him if he would run such a line as I suggested, before commencing work at that point, and send the result of the survey to me at New York, which he promised to do.

On leaving Omaha for St. Joseph, by steamboat, I took occasion to examine from the pilot-house, the bluffs between Omaha and the mouth of the Pappillon, for the purpose of ascertaining whether there were any depressions between those points through which a line could pass, with low grades, between the Missouri and Mud Creek Valleys, and I became satisfied that it could be done. The opinion was then formed that a very palpable engineering mistake had been made, either in fixing the terminus of the road at Omaha, or in the location of the line between Omaha and the Platte Valley.

Soon after returning to New York, in November, I inquired of Mr. Durant, the Vice-President of the Company, whether the location of the line between the Missouri River and the Platte Valley was to be regarded as fixed beyond change; or whether it could be so far regarded as an open question that I would in any manner be held responsible for it hereafter, as Consulting Engineer of the road. He informed me that he regarded the terminal point as fixed beyond change; but if I could suggest any change in the location of the first forty miles that would be regarded as a decided improvement in the route, it was unquestionably my duty to do so at once, and before any further expenditure had been incurred upon the line as then located.

I immediately commenced an investigation of the subject, by collecting

the data on file in the office, which consisted of a map and profile of the located line, together with maps and profiles of preliminary surveys from the Elkhorn, down the Platte Valley to its mouth, and down the West Pappillon to Bellevue.

In the meantime a correspondence, bearing upon this subject, occurred between Mr. Dey and this office, a copy of which is annexed hereto.

From the information obtained from these profiles, and the correspondence with Mr. Dey, together with the general knowledge of the country acquired during my hasty visit in October, resulted the report of December 21, 1864, Mr. Williams' letter of January 2, 1865, and the subsequent abandonment by the Company of the old location between Stations 150 and 900, and the adoption of the line, as then recommended, down Mud Creek and up the Pappillon Vallies.

It should be borne in mind, however, that the change in location and grades between Stations 150 and 900 was not all that was specified, either in my report or the letter of Mr. Williams, as being necessary for the Company to do before realizing the advantages claimed for the new route by reason of the reduction of the maximum grades to forty feet per mile in each direction.

The grading, then nearly completed, between Omaha and Station 150, was to be used only temporarily; and it was recommended, "that for the present, as little money as practicable be expended in grading in the Valley of Mud Creek, between Station 150, and the point where a line with moderate grades in both directions would naturally leave this valley to enter the Valley of the Missouri River." The line here referred to, "*with moderate grades in both directions*," was the route heretofore alluded to, as passing through the depression in the bluffs between Omaha and the mouth of the Pappillon, and which I assumed would, as a matter of course, be adopted hereafter by the Company.

It was also stated in the report that the grade of eighty feet per mile, near the Elkhorn, must hereafter be reduced to forty feet per mile, either by a slight change in the location, or by deepening the excavation and raising the embankment upon the present location. With these changes in alignment and grades, it was claimed that the new route would possess all the advantages over the old route assumed for it in the report.

It may also be proper to state in this connection, that Mr. T. C. Durant, Vice-President, never, to my knowledge, advocated the change in location, either in or out of the Board of Directors. On the contrary, he seemed to be reluctantly forced into a passive assent to the change, by the weight of the argument in its favor, and the judgment of the Government Directors, together with the advice of Mr. Usher, then Secretary of the



Interior, who happened to be in the office of the Company when the matter was under discussion, and represented to the Board that the President, Mr. Lincoln, would undoubtedly favor the change.

The matter, however, was never submitted to Mr. Lincoln for his approval before his death; nor was it officially laid before the Interior Department until the day fixed for the retirement of Mr. Usher as Secretary.

It is not strange, therefore, in consideration of the extra charge upon the Government subsidy, growing out of the elongation of the line; and the clamor and misrepresentations made as to the facts in the case, and the motives of the Company in making the change, by parties who suppose that their private interests will be affected unfavorably thereby, that Mr. Harlan, the present honorable Secretary of the Interior, should recommend to the President that the matter be examined and reported upon by a competent and disinterested Government Engineer, before taking final action upon it.

You will see from the foregoing statement that I incurred a very serious personal as well as professional responsibility in recommending so important a measure to the company, upon information and data so slight and unreliable; but it was an issue that I could not consistently avoid when I found that my own reputation as an engineer was at stake. I am conscious of having entered into the discussion with a single eye to what I regarded as the real interests of all parties who had a right to be consulted in the matter; and whatever may be the final result, I shall always feel that my duty to the company, as their consulting engineer, has been faithfully performed.

You will find, on examining the data herewith submitted, which is principally the result of surveys instituted at your own request, and conducted under your own direction and supervision, that all that was claimed for the amended route, in my report to the company of December 21, 1864, has been much more than realized, all of which, as a matter of course, is exceedingly gratifying to me.

The line, instead of being nine miles longer than the old one, is found to be but a fraction over eight miles. The maximum grade, to which the amended line may be easily adapted, is thirty feet per mile, instead of forty, as claimed in my report. An additional argument, not found in my report, has also been developed by the recent surveys, which should, in my opinion, be entitled to great weight in the discussion of this question; which is, that by constructing, at moderate expense, a branch from the mouth of Mud Creek, down the valley of the Pappillon, to the Missouri

River, a distance of five and a half miles, the summit between the valley of Mud Creek and the Missouri River may be avoided, the line shortened more than three miles, and the grades ascending from the Missouri to the Platte Valley reduced to a maximum of *twenty feet per mile*.

It may, and probably will be claimed, that this latter argument has nothing to do with the question at issue, for the reason that it looks to an eventual change in the eastern terminus of the road, from a point once fixed by the President, without adequate surveys, and probably without due consideration of the important engineering and commercial principles involved in the decision. My own experience and observation however have taught me that, however much political and personal interests are allowed to influence and control the initial steps necessary to the commencement of a great national enterprise like the Union Pacific Railroad, the result will always show; that in its final location and construction the real interests of all parties will be best subserved by adopting and adhering to the fundamental principles and laws of engineering and commerce, which time and experience have rendered almost immutable.

Without considering the question of the original comparative cost of the respective routes, which in my opinion (as stated on page 5 of my report of December 21, 1864) has very little to do with the subject, it appears to me that the case, as now presented to you, involves the following simple proposition :

Is it better for the Railroad Company, the Government, and the public, that the Union Pacific Railroad, in view of all its future eastern connections and probable business, shall be so located and constructed that thirty miles of its eastern terminus will for all time be subjected to ruling grades of 66 feet per mile ascending westward, and 79.2 feet per mile ascending eastward ; instead of being located and constructed upon a route which, by increasing the distance eight miles, and the future expenditure of \$245,000 will admit of ruling grades of 30 feet per mile in each direction ; or, by increasing the distance five miles and the future expenditure of \$132,800, will admit of ruling grades ascending 20 feet per mile westward, and 30 feet per mile eastward, between the Missouri River and the head of the Great Platte Valley, a distance of more than five hundred miles.

It is not my purpose, Colonel, in this communication, to argue the question any further than to call your attention to the real facts in the case, together with the general principles assumed in my report of the 21st December, 1864, as being applicable to similar cases ; and which I believe will be substantially indorsed by all experienced railroad managers in the country.

I enclose for your information a copy of a letter upon this subject, under

date of January 11, 1865, from Mr. John B. Jervis, whose opinions are, from his long and varied experience, justly entitled to great consideration in matters of this kind.

I have the honor to be, Colonel, very respectfully,

Your obedient servant,

S. SEYMOUR,

*Consulting Engineer Union Pacific Railroad.*

Colonel J. H. SIMPSON,

*U. S. Engineers, Washington, D. C.*

*T. C. Durant to Col. Simpson.*

*Reply to a Communication from a Committee of Citizens of Omaha, to Lt.-Col. Simpson and Hon. Springer Harbaugh, touching the change of location, terminus, &c, of the Union Pacific Railroad.*

UNION PACIFIC RAILROAD COMPANY, }  
President's Office, 13 William Street, }  
NEW YORK, August, 26th, 1865. }

Col. J. H. SIMPSON,

*U. S. Engineer Corps, Wash., D. C. :*

Dear Sir,—Through the kindness of the Hon. Springer Harbaugh, a Government Director in this road, I have been furnished with a copy of a communication addressed to yourself and Mr. Harbaugh, by Messrs. Enos Lowe and Gilbert C. Monell (who claim to be a committee of the citizens of Omaha, Neb.), in relation to the location of the Union Pacific Railroad, west of Omaha, and other matters connected with that road.

Supposing, from the contents of this paper, and the style and manner of its address, that it is intended you should transmit it with your report to the Secretary of the Interior, I consider it my duty to call your attention to a few of the many erroneous statements which it contains; also to request that this letter may be appended to the said communication; although I am not able to see why either communication should affect the question at issue; and am extremely reluctant to notice or refer to the complaints or censure of disaffected employees or parties rendered hostile, because a great work cannot be made to subserve local interests.

Many of these questions come under the province of the Board of Directors, in which the Government are represented by five members; and not particularly within that of the President, or the Secretary of the Interior.

In order to save time, I will not quote at full length from this communi-

cation, but merely notice and refute some of the misstatements that occur, in their proper order.

#### 1ST.—WITHDRAWAL OF LANDS.

The preliminary location of the first one hundred miles was filed in the Department of the Interior by the Vice-President of this Company upon a line traced for that purpose, and which did not purport to be a correct survey and permanent location. Upon this the land was withdrawn from sale or pre-emption. Subsequently, the line, as located by the engineers, was filed and approved by the President, upon the request of the Company.

#### 2D.—SURVEYS AND RECOMMENDATIONS OF THE ENGINEERS.

By referring to the published "Report of the Organization and Proceedings of the Union Pacific Railroad Company" (Appendix 1 a, pages No. 1 and 2), it will be seen that Mr. Peter A. Dey, engineer in charge of surveys, reported upon six different lines; and states with reference to the line from Bellevue, "that for cheapness of construction and operation, this is without any question the most desirable line."

#### 3D.—MR. DEY'S CONNECTION WITH THE COMPANY.

Inasmuch as frequent reference is made in the communication of the committee, to the acts and opinions of Mr. Peter A. Dey, an engineer formerly in the employ of this Company, it appears proper that you should be correctly informed respecting some facts relating to his former connection with this road, as well as to the manner and cause of his leaving the service of the Company:

In August, 1863, becoming satisfied that the subscription to the stock of the Union Pacific Railroad Company would, during the Fall, reach the amount required by law before perfecting the organization of the Company; and foreseeing that the same could not be accomplished in season to make any surveys during that year; and being fully aware of the importance of obtaining a definite knowledge of the topography of the country west of the Missouri River, opposite the State of Iowa, before any opinion could be formed as to the most suitable point for the eastern terminus of the road, as well as the importance of a more definite knowledge of the difficulties to be encountered in some of the mountain passes, I instructed Mr. Dey to organize engineering parties to survey several lines from the western border of the State of Iowa, to a common point in the Platte Valley; and also to dispatch a party of engineers to examine and run a line through Cheyenne and Bridger Passes. (A copy of my instructions will be found

in the printed report of the Company, submitted herewith, page 39, and subsequent.)

Mr. Dey being at the time in the employ of the Mississippi and Missouri Railroad Company, at a moderate salary, which company were willing to give him leave of absence, he was selected by me to take charge of the preliminary surveys, because he had already some knowledge as to the character of the country to be examined, was favorably situated for making up the parties, there being several engineers formerly in the employ of the Company, whose services it was thought he might obtain at once, and thus save time; and from motives of economy in the outset, his salary being continued for the time by the Mississippi and Missouri Company.

Mr. Dey was never appointed chief engineer of the road. He was styled "engineer in charge of surveys." After the organization of the Company his services were recognized, and he was continued as engineer, and entrusted with the duty of commencing and carrying on the grading of the first forty miles west of Omaha. The prospect of his being able to complete the work within any reasonable time, may be inferred from the following extracts from his correspondence:

April 2d, 1864, he writes: "I find difficulty in getting bids on this heavy work on account of the time for completing it; can you send some reliable contractors?" April 28th, 1864, he writes: "I have telegraphed and written all the contractors that I was satisfied we could rely upon to bid on this forty miles of work." May 14, 1864, he writes: "It is impossible to do anything in the way of letting this work now without some provision for furnishing men. I had on my file of letters in February, quite a number of applications for constructing. I had telegraphed or written every responsible contractor, that we were prepared to receive proposals for this work. The uniform response has been that they were, with the present scarcity of men, afraid to take the work at any price to be finished in a specified time—I do not know what to do. The question with me has been whether it would be policy to import a thousand men or more—we can work them to advantage for a long while. I will write you again to-morrow, as I feel entirely discouraged." June 20th, 1864, he writes: "Our experience has shown that it is useless to pay the expenses of men out here to do this work, as every train that starts for Bannock City takes from the work from ten to twenty men to drive the teams. Sprague's Canada wood-cutters have nearly all left; portions of Williams' work has proved very hard, so much so that on the first of the month he threw up the job;" "he has lost, since he started the

work, several hundred dollars per month, partly owing to material and partly owing to the high price of labor and difficulty of getting work out of the men. I have not succeeded in letting the rest of the work." "Our timber men have fallen off very much. I have no faith in getting men from Canada for that kind of work," &c., &c.

Finding, from his correspondence, that the necessary work of construction was not progressing to the satisfaction of the Company, a contract was negotiated, in August, for the construction and equipment of the first hundred miles west of Omaha.

The Company considered this as the only chance of completing the heavy work west of Omaha, and finishing one hundred miles in the time required by the Act of Congress. Nor have they since changed their opinion upon this subject. They have the right, whenever they find it to their advantage so to do, to cancel the contract by giving ninety days notice of their intention, and paying for the work, so far as the same may have been performed. For a time they had the right to assume the work by giving five days' notice; but when the contractors had advanced more than one million of dollars, and had contracted to a large amount for material to be delivered, it was considered but just and equitable that sufficient time should be given to adjust and close up, as near as possible, unfinished portions of the work. The Company did not feel disposed to rely upon the judgment of Mr. Dey in this matter; and his position not being such as rendered it necessary that he should be consulted, his opinions were not asked either before or after its execution.

Subsequent to the contractors taking possession of the work, Mr. Dey was still retained in the employ of the Company, and a portion of the disbursements were made through him; and in October he was furnished with a copy of the letter and acceptance of the contract, which related to the character of the work, conditions, etc., etc, in order that he might understand fully what the specifications called for, and to govern him in all matters pertaining thereto. Further than this I do not think he has any knowledge of the conditions under which the contract was given, or of the supplementary agreements or modifications relating thereto.

It was intended that a portion of the work already commenced, should be continued under the supervision of the Company's Engineer, he acting as Disbursing Agent, and the cost of same charged to the account of the contractors. Mr. Dey, therefore, continued to act in this matter, without alluding to the contract, until the early part of December.

In the meantime, a party had been sent to examine the affairs of the Company at Omaha; and to look after the manner of keeping accounts, etc.; and in reply to Mr. Dey's request for money for his monthly disbursements, the following telegram, sent only a few days previous to the date

of his resignation, may or may not have influenced him in sending the same :

NEW YORK, *December 1, 1864.*

P. A. DEY,  
*Omaha, N. T. :*

We want vouchers for your expenditures. When you have matters systematized in a business way, funds will be provided. Satisfy Mr. Henry's book-keeper and he can draw at sight.

(Signed)

T. C. DURANT.

Whether the Company have done him injustice in disregarding his arguments in favor of the location he recommends, in not relying implicitly upon his judgment ; or in failing to appreciate his ability in construction, you, who have so recently examined the one, and the Government Director who has condemned a portion of the other, (and which the Company have already given orders to be rebuilt,) can easily determine.

In the month of October, 1864, the Hon. Jesse L. Williams, one of the Government Directors, and also an Engineer of great experience ; together with Colonel Silas Seymour, the Consulting Engineer of the Company, visited Omaha for the purpose of examining the country, and inspecting the work. Soon after returning to New York, they severally recommended the Company to change the location of the road between Omaha and the Platte Valley, so as to avoid the maximum grades of eighty feet per mile upon the line being constructed, and substituting therefor a line with maximum grades of forty feet per mile. While investigating this subject, and collecting the necessary information for his Report, Mr. Seymour wrote Mr. Dey as follows, under date of November 30th, 1864 :

"I think you promised me that you would make some further examinations with reference to lengthening the line, and reducing the grade, as well as quantities of excavation and embankment, east of the Elkhorn, between Station 1069 and 1109. I wish you would do this at once, and send me a sketch of the line and profile, with a grade as low as fifty feet per mile, and the line extended along the face of the bluffs, so as to reduce the quantities as much as possible. Also advise me whether, from your surveys, and knowledge of the country, it is practicable, by continuing the line from the west, down the Valley of the West Pappillion, to the junction of the East and Middle Pappillion, to diverge northerly in the direction of Omaha ; and follow up one of the streams flowing from that direction to your first summit, as shown on the map ; and thus, by lengthening the line a few miles, avoid most of the heavy work and grades upon the present line. And also whether, in the same connection, the line could not follow down the Platte Valley to a point just above the junction of the "Cut-off" and Elkhorn, and then break through the bluffs just above Iron Bluff, and enter the valley of a more southerly branch of the Pappillion. I confess that I have not been able yet to comprehend fully, the theory of the location of the first twenty-two miles of the road ;

and I can find nothing in your reports to this office that fully explains it. I shall feel greatly obliged, therefore, if you will post me up as much in detail as possible."

The following order was sent by telegraph on the 12th of December, 1864:

NEW YORK, *December 12th, 1864.*

P. A. DEY, *Omaha, N. T.:*

Stop work on west end of Section Eleven; line will be modified into Valley. Can work on east end of section. Line between Sections Two and Ten will probably be changed. Run line down Mud Creek to intersect Bellevue line; also down Mud Creek to small stream in Section Ten, Township Fourteen, through Sixteen, to intersect line at mouth of Big Papillion. Have you received Seymour's letter?

(Signed)

T. C. DURANT.

The following letter was received from Mr. Dey:

"OMAHA, *December 12th, 1864.*

"T. C. DURANT, Esq.:

"Dear Sir,—I have a letter from Mr. Seymour, criticising our location from Omaha to the Elkhorn River, and making suggestions at great length. His earnestness is further evinced by a telegram sent a few days after his letter was mailed, urging an immediate and full answer from me. This part of the road was located with great care by me. You even animadverted on my going into the field personally to examine proposed lines. You also promised to have the lines scrutinized by a committee of Engineers nearly a year ago.

"The line, as located by me, has been approved, and the location has been acted upon for a year. It is too late, after spending so much time and money on the construction, to go back and consider relative merits of this and other lines. The present location is right, unless it is desirable for the Company and Government to make a longer road, more bridges, heavier excavations; and expend, on twenty miles, the money which should be expended on one hundred miles of road.

"Your views favored the economical policy, which was certainly the true policy of the Company. I acted upon it deliberately, and, as I still think, wisely.

"In view of the decided advantages of this route, and of the expenditures already made, it is, in my opinion, altogether out of the question to modify the location to meet the undigested views of Mr. Seymour, who cannot know the relative advantages of one route over another, because he has not been over the country, and, from the tenor of his letter, not even examined the profiles in the New York office.

"I regret that I had not, when I made the location, the advantages of his experience; then it would have been useful; and some of his sugges-



tions might have been adopted ; but the Company is entitled to my best judgment now, as heretofore, and my action is entitled to a fair consideration by its officers.

“ Respectfully yours,  
(Signed) “ PETER A. DEY.”

I desire to call your particular attention to the following extract from above letter : “ The present location is right, unless it is desirable for the Company and Government to make a longer road, more bridges, heavier excavations, and expend, on twenty miles, the money which should be expended on one hundred miles of road.”

Let me ask you, who have examined the ground, and have all the facts, how can a man with ordinary sense expect a corporation to place any reliance upon his statements ; or the least confidence in his ability, who deliberately makes a report to his employers so utterly at variance with the facts as they actually exist ; or look upon any of his opinions, except with distrust. Entirely without experience in the management of railroads himself, he has set up his individual opinions against those of the most experienced engineers and railroad men in the country, and seems to expect that the Company will unhesitatingly adopt them.

From the foregoing statement of facts relative to his connection with the road, you will be able to form an intelligent opinion as to the real cause of his leaving the same. His remonstrances were disregarded by the Company, and about this time he sent in his resignation.

It has been an unpleasant task for me to allude to this subject, but the representations of the committee of the citizens of Omaha ; and the fact that Mr. Dey is in the employ of interested parties in that place and laboring to thwart the honest endeavors of the Company to do their duty, representing that he is a friend of the enterprise, renders it imperative for me to state the facts, that he may not use the position and influence his connection with the Company has given him, in furtherance of his hostile endeavors.

#### 4TH.—THE AVOWED OBJECT OF THE CHANGE.

This is most palpably mis stated in the communication referred to.

The object, as really entertained, and publicly avowed by the Company, was, by lengthening the line about nine miles, to change the ruling grades from 80 to 40 feet per mile between Omaha and the Platte Valley. The subject of a change of terminus has never been discussed, or even suggested in the Board of Directors, in connection with this subject ; neither has it been alluded to in the report and recommendations made by the Company's engineers. The surveys that have been made since the change

was decided upon by the Company have demonstrated, that the new route is susceptible, at a very slight comparative expense, of being still further improved, and is intended to embrace all the advantages to be gained by the line down the Missouri Bottom, several miles, and thence across the bluff, connecting with Mud Creek line, as recently surveyed by Mr. Ainsworth; as well as the future adoption of a thirty foot grade into the valley of the Elkhorn; whereas, it is deemed entirely impracticable, except at an expense which even the promotion of the private purposes and interests of the property holders and citizens of Omaha, that are represented by this committee, would scarcely justify, to reduce the maximum grade upon the old location very much, if any, below 80 feet per mile.

#### 5TH.—TELEGRAPHIC CORRESPONDENCE.

It is claimed that my despatches to different parties at Omaha, show evidence of a determination on my part "to intimidate Omaha and Council Bluffs into a passive submission," etc.; and for the purpose of proving this charge, several garbled extracts are made from the despatches sent from this office.

The following are true and complete copies of despatches sent from this office, June 1st, 1865, directed to Mr. J. E. House and Mr. E. Creighton, respectively, at Omaha:

"June 1st, 1865.

"J. E. HOUSE,

"Omaha, N. T.:

"Make arrangements for temporary track from Bellevue to Junction without regard to grade, which can be changed when permanent location is made; secure place for saw-mill and Burnetizing machine, at Bellevue. You don't answer relative to brick and material. Do not work north of Junction. We have no time to lose, and must commence at Bellevue as our only alternative to save enterprise.

(Signed)

"T. C. DURANT."

In reply to a telegram from Omaha, from which I inferred that they were laboring under the impression that the change in location had been made in consequence of the citizens not having complied with their agreements, or that something was required of them, I sent the following:

"June 1st, 1865.

"E. CREIGHTON,

"Omaha, N. T.:

"Omaha is all right. Mr. House has the reasons for making the change, which I regret as much as you do. If Secretary Harlan insists upon old location we submit, but shall build from Bellevue first, and finish line on old location thereafter, if Congress does not release us from it.

"We shall lose through business on the high grades, and must cross river elsewhere, consequently need no buildings at Omaha.

(Signed)

"T. C. DURANT."

The following are true and complete copies of two despatches sent from this office on the 9th June, 1865, each directed to E. Creighton, at Omaha, in reply to his questions: "If the new route is made, will you go on with the buildings at Omaha, and make this the *only* point of crossing the river, if so, the citizens of Omaha will aid you on new line":

"June 9th, 1865.

"E. CREIGHTON,

"Omaha, N. T.:

"Shall make no promises as to crossing the river. We had made our arrangements to build at Omaha. We have had enough of interference. We shall consult the interests of the road whether citizens aid us or not; I should recommend, however, that you do not oppose new location; for if old line is adopted, Cedar Rapids Road will cross at De Soto, and M. and M. will connect that. The only chance to prevent this is a reduction of grades.

(Signed)

"T. C. DURANT."

That the position of affairs might be more fully understood, I also sent this:

"June 9th, 1865.

"E. CREIGHTON,

"Omaha, N. T.:

"It will cost one million of dollars more to complete the road through Iowa *via* Des Moines to Council Bluffs, than to build Cedar Rapids. Your people and papers will destroy the last chance you have, for the terminus of our road at your place will not help you, if there is no road to connect East.

If any more obstacles are thrown in the way, we shall make application to the President to change the terminus.

(Signed)

"T. C. DURANT."

It will be observed that the despatch to Mr. Creighton, of the 1st June, reads quite different from the one contained in the communication of the committee; and that the committee have selected such passages as suited them from each of the despatches of the 9th June, and consolidated them into what purports to be one despatch.

The following is a copy of a despatch sent to this office by the party to whom it was addressed, which seems to have been strangely omitted from those embodied in the communication of the committee:

"OMAHA, June 10th, 1865.

"The people here will be satisfied with Mud Creek route, if Bellevue movement be abandoned and permanent buildings be erected here at once.

Omaha must be only point of connection with Missouri River: without this there will be trouble.

(Signed)

"E. CREIGHTON."

I shall dismiss this branch of the subject with the single remark, that I am willing to submit to the judgment of any candid and disinterested reader of the entire correspondence, as to which of the parties was then, and is now, endeavoring to place this controversy upon its true merits; and also as to which is making efforts to "intimidate into passive submission" the other.

#### 6TH.—CHANGE OF TERMINUS TO BELLEVUE.

The committee say, that "in view of this whole procedurc, we can see nothing but a covert design to change the terminus for speculative purposes," etc. The case, as presented by the committee, might, it is true, bear this construction; but will the real facts in the case justify such a conclusion? Let us see:

The laws of Congress require that one hundred miles of the Union Pacific Railroad, between the Missouri River and the 100th meridian, shall be completed within three years after filing by the Company (in the office of the Secretary of the Interior) their assent to the organic law.

Their assent was filed on the 27th June, 1863, consequently the charter and organization might be forfeited unless one hundred miles are completed by June 27th, 1866.

This, and the knowledge of the difficulties to be overcome under the most favorable auspices, in order to complete enough of the road this season to redeem the pledge given those who had advanced the Company means for the prosecution of the work, was in my mind when I telegraphed Mr. House that "We have no time to lose, and must commence at Bellevue as our only alternative to save enterprise."

The original location between Stations 150 and 900 had been abandoned under the advice of Mr. Usher, then Secretary of the Interior, the Government Directors, and the best engineering talent that could be found; and the materials for superstructure and equipment for eighty miles, was being delivered rapidly at Omaha. We were about ready to commence laying the track. The President of the United States, at the suggestion of Mr. Harlan, the Hon. Secretary of the Interior, had declined approving the new location until the whole subject could be examined and reported upon by a Government Engineer to be detailed for that purpose. Some of the people of Omaha were throwing obstacles in the way of constructing the road upon the new location.

The Company had no authority for building the road upon that location

until the route should have been approved by the President. Many of the land owners along the line were threatening to stop the work, and prosecute the Company for trespassing upon their property. The Company had incurred large obligations for money, predicated upon the completion of twenty miles of the road within a given time. What, under all these circumstances, was to be done? Were we to fold our hands and allow the Company to be discredited, and the entire organization to be legally forfeited? Certainly not; our only alternative seemed to be to organize a Company under the General Railroad law of Nebraska, by which to legalize our proceedings, and then lay a temporary track from the Missouri River, at or near Bellevue, to the intersection of the original location at Station 900—over which we could transport the necessary material for the track from that point westward into the Platte Valley, upon the main line of the Union Pacific Railroad; and thus “save the enterprise;” and at the same time maintain the credit of the Company,

I did not advocate the change in the first instance, and only reluctantly consented to it—not from any want of conviction as to the propriety of the recommendations of prominent engineers, so far as the economical operating of the road was concerned—but from the firm conviction that the change would create an opposition from parties interested in private speculations, and thus bring about discussions and perhaps delays, the latter of which might endanger the enterprise.

I believed then, and that belief has been fully justified, that it would be far better for the Company to construct a road on the old location, abandon the same hereafter, and incur the expense of a new line to the Missouri River at Bellevue.

This was the cause of the Bellevue alarm, about which so much is said in the communication of the committee.

The idea was abandoned for the time, and work resumed and material sent to Omaha, upon the assurance of the Hon. Secretary of the Interior that no time would be lost in bringing the matter before the President of the United States for his final decision, and the fact ascertained by careful examination that the work on the proposed line had so far progressed that it was cheaper to complete the grading to a point where a line from the Missouri River at Bellevue would intersect, than to grade for a temporary road from that point to the river.

Should the decision of the President be adverse to the new location, it will, for the reasons above stated, still be necessary to resort to the expedient of a separate organization for that portion of the road east of the point of junction with the old location.

It was in view of this contingency, and the final results that I foresaw

would most naturally flow from it, that I endeavored, with all the force and earnestness at my command, to impress upon the people of Omaha, that their position, as the permanent terminus of the road, depended upon the prompt adoption by the President of the route with the lowest ruling grade; and that their opposition to this route was a source of great embarrassment and delay to the work; and would, in all probability, endanger the future welfare of the place; but I could not pledge the Company upon so important a matter, as to the *only place* its road should cross the river.

These warnings and remonstrances, however, have all been disregarded, and, in return for them, I have received nothing but misrepresentations and abuse. Whatever the result of the agitation of this subject may be, therefore, upon the future welfare of Omaha, I feel that the citizens, through their representatives, and not myself, will be justly held responsible for it.

As to the "speculative purposes" with which I am charged, I can only say that I do not now, and never have owned, in my own right, one dollar's worth of property in the Territory of Nebraska.

The interests of my friends, so far as they have any, that will be affected by the final decision of this question, are centered at Omaha and Council Bluffs; so that my personal sympathies, so far as they could be exercised without prejudice to the interests of the Company, have always favored every measure that would be likely to promote the welfare of those localities.

It was proposed that the citizens of Omaha should donate to the Company the right of way, and a suitable site for depot buildings and machine shops.

This, however, has been done only in part, and a portion of the lands so donated is unsuitable for the purpose and of little value, or is so situated that the cost of rendering it fit for the purposes of the Company, would exceed that of purchasing land more suitable.

I do not know to what extent the land referred to by the committee has been donated; the deeds, I understand, when the property was so situated as not to be available for the uses of the Company, had been executed to me as trustee, and are all in the hands of the land commissioner of the Company to be exchanged for or sold to aid in the purchase of such property as the Company may require for its own use. The titles were thus made, for the purpose of allowing the property to be reconveyed with less trouble than could be done if deeded to the Company, and subject to their mortgages.

## 7TH—GRADES OF 116 FEET PER MILE.

The charter of the Company requires that "the grades and curves shall not exceed the maximum grades and curves of the Baltimore and Ohio Railroad." These are grades of 116 feet per mile, and curves of 400 feet radius. The lines reported upon by Mr. Dey, between Omaha and the Platte Valley, were all very expensive and undulating on account of their running over the swells and divides of the country, instead of around them. The one selected, however, was found to be adaptable, at a great expense, to a maximum grade of 80 feet per mile, and this grade was adopted at the commencement of the work. The slow progress made in grading, during the spring and summer of 1864, rendered it necessary in the fall, to change these grades in some instances to 116 feet per mile, in order to insure the completion of the first one hundred miles within the time required by the charter—so that, when the work between stations 150 and 900 was suspended in January, 1865, some of the heaviest excavations and embankments were actually being constructed with a maximum grade of 116 feet per mile. It was the intention of the Company, however, to reduce the grades with gravel trains as soon as practicable, after having complied with the requirements of the law, as suggested in the following letter of Col. Seymour, written by my direction to Mr. Dey, dated November 19th, 1864 :

UNION PACIFIC RAILROAD COMPANY, }  
President's Office, 13 William Street, }  
New York, November 19, 1864.

PETER A. DEY, Esqr.,  
*Engineer in Charge, etc.,*  
Omaha, N. T. :

Dear Sir,—I have been looking over the profile of the first twenty miles west of Omaha, with Mr. Durant; and he desires me to make the following suggestions for your consideration and guidance.

It is considered safe to assume that the necessary materials can be delivered at Omaha as early as the first of June next, for commencing the laying of the track vigorously westward; and therefore it is very desirable that the grading between Omaha and Elkhorn River, including the bridge, should be so far advanced as not to interfere with, or retard the laying of the track to the Platte Valley by that time; and also for the additional reason, that the grading will then be so far advanced westward of the Elkhorn, that the track may be laid continuously for from thirty to fifty miles, and perhaps, eighty.

In view, therefore, of the great importance to the Company and the

public, of extending the road as far as possible up the Platte Valley during the next season, together with the very great difficulty of procuring labor at the present time, it is thought advisable, in the heaviest portions of the work on the first twenty miles, to adopt temporary grades, with an inclination if necessary in extreme cases, of 120 feet per mile; and also to excavate the cuts to the narrowest width that will admit of the safe passage of a train, and the convenient and economical prosecution of the work. After this is done, and the track laid to the Platte Valley, it is proposed, before the road is offered for the acceptance of the Government or opened for the transaction of business, to complete the grading to the full width and present grades, with construction trains, by means of which it is believed it can then be done much more economically than now,

With reference to the location and construction of the line, station houses, machine shops, engine houses, etc., at the western terminus, it is not considered important that anything decisive should be done before quite early in the spring, or in time to receive and protect the cars and machinery that will be necessary for the transportation of the iron and other materials for the track as it arrives by the earliest freshet in the Missouri River.

Hoping that these views and suggestions will meet with your approval

I remain yours, very truly,

S. SEYMOUR,

*Consulting Engineer.*

This, you will perceive, was done at a time when we had every reason to suppose that the route adopted by the Company, and approved by the President of the United States, was really the best and most practicable route for the road between Omaha and the Platte Valley.

The case now stands quite differently: a much better route for all parties in interest has been discovered, that admits of much improved grades, between Omaha and the Platte Valley; and it is also ascertained that, if the business of the road should hereafter require a further reduction of grades, ascending westerly from the Missouri River, in order to accommodate the great preponderance of trade in that direction, a branch of three or four miles in length may be constructed down the Pappilion to Missouri River, which will reduce the maximum grade ascending westerly, to 20 feet per mile over the entire distance from the Missouri River to the eastern base of the Rocky Mountains.

With these facts before them, and their importance satisfactorily demonstrated, it appears to me, if the new line is rejected, that this Company cannot, with proper regard for the interests either of the Stockholders, the



Government, or the public, expend any more money upon the old location than is absolutely necessary to meet the requirements of the law ; and it seems but reasonable to anticipate, that Congress, upon a proper representation of facts, would interfere to prevent an unnecessary waste of labor and capital upon a route which the laws of gravity and trade will sooner or later render comparatively worthless. For it must be borne in mind that the Government bonds to be issued to this Company are not a subsidy but a loan to the Company, and are a lien on the road, taking precedence of the stock ; and ultimately to be paid by the Company, which would fail to protect its own interest did it not apply the means at its command in constructing the road upon such route as would best assure a remunerative return.

The Company has never claimed, nor represented, that the amended location asked for, embodies at the present time, all the advantages that may be attained over the original location ; as about three miles of the old line, west of Omaha, was embraced in the amended location, on account of the work on the same having been nearly completed when the change was made, on which there is a maximum grade greater than forty feet. They do represent, however, and claim, that the amended route, while it is far superior with its present grade, is easily, and at a very slight comparative expense, susceptible of being still further improved, so as to embody all the advantages claimed for it ; while the original can never, within any reasonable limit of expenditure, be so far reduced in grade as to make it a desirable connection for the railroads east of the Missouri River.

By adopting the line, recently surveyed by Mr. Ainsworth, down the Missouri bottom a short distance, and across to the Mud Creek route, which can be done at a reasonable cost, trains going west will only have a maximum grade of thirty feet to overcome, while those coming east can use the present descending grade on the first three miles west of Omaha, thus giving all the advantage of a double track.

These improvements in the grade will, as a matter of course, be adopted and carried out by the Company as soon as the business of the road will justify the expenditure ; that it shall be done sooner, seems to be inconsistent, both on the part of the Government and the people.

#### 8TH—STOCKHOLDERS AT OMAHA, AND PROPOSITION FOR CONTRACT.

Inasmuch as the management are accountable to the stockholders in all matters pertaining to the affairs of the Company ; and are elected annually by them, it is but fair to presume that if there were any reasonable ground for complaint, those whom this committee claim to represent

would lend their aid to bring about a change.

How much of the entire twelve hundred dollars invested in the stock of the Company by parties residing in Nebraska Territory, and the western part of Iowa, is represented by this committee, I am unable to state; but certain it is that neither of the names of these gentlemen appear on the books of this Company as stockholders.

The enterprising and responsible people of Omaha, so desirous to contract for building the road, were quite safe in making the proposition to their own committee, instead of the Railroad Company.

#### CONCLUDING REMARKS.

Owing to the fact that Major-General John A. Dix, the President of the Union Pacific Railroad Company, has, during the recent rebellion, been obliged to devote nearly the whole of his time to the performance of the military duties assigned him by the Government, the duty has devolved upon me, as Vice-President, since the organization of the Company, to act as the principal executive officer in the administration of its affairs. In doing this it has been my earnest wish and purpose to act, not only justly but liberally to all parties and interests who had a right to be represented in this great national enterprise.

That errors have been committed is not at all unlikely, as I do not claim to be infallible; but I am not conscious of doing intentional injury to any one.

I have never supposed that this great work, involving the expenditure of hundreds of millions of dollars, was being built exclusively for the benefit of Omaha; nor that the half of the entire Union lying upon either side of the Missouri River, was for all time, to be compelled, in their intercourse with each other, to pay tribute to any particular point or locality upon that river, for the privilege of intersecting or crossing it; but that it was designed that this road should follow the most natural and eligible route which nature has left open for it, through the difficult and mountainous country which it was to traverse. It has been only upon this assumption that I have invested largely of my own means; and been able to induce others to invest theirs, during a period of the most unexampled financial embarrassments, growing out of our national difficulties. But I have succeeded, thus far, through the co-operation and financial ability of our Treasurer, J. J. Cisco, Esq., together with the aid and support of an intelligent Board of Directors, and confiding friends and capitalists, in placing the enterprise beyond the reach of failure; and, provided the Government shall see fit to endorse the policy of the Company in the matter now under consideration, in which I know they have acted in the utmost

liberality and good faith, I have the fullest confidence in their ability to prosecute this great work to a speedy completion.

On the other hand, if the policy of the Company shall be repudiated by the Government; and the completion of the first consecutive one hundred miles west of Omaha be thereby delayed one year or more, I shall still persist in my efforts, and the use of every legitimate means, to hasten forward to its final completion a work with which I shall ever deem it an honor to have been connected.

I have the honor, Colonel, to be,

Very respectfully,

Your obd't servt.

THOS. C. DURANT,

*Vice-President U. P. R. Co.*

*T. C. Durant to Col. Simpson.*

UNION PACIFIC RAILROAD COMPANY, }  
Secretary's Office, 18 William Street, }  
New York, August 28, 1865.

COLONEL :

In order that you may more fully understand the policy of this Company in regard to the location of the road between the Missouri River and the Platte Valley, I beg leave to submit the following statement :

The interests of the stockholders, the bondholders, the public, and the government, demand that the line should be so located as to insure the most safe, rapid and economical working of the road when completed.

The line as originally located shows heavy grades and sharp curves, which, although they may not prove a serious objection while there is but a small traffic over the road, will become formidable whenever the traffic is increased, and add largely to the expenses of working the road, as well as increase the liability to delays, accidents, &c.

The Directors of the Company would therefore be sadly lacking in their duty to all parties interested, if they did not use every endeavor so to locate the line in the first instance as to admit of such modifications and improvements hereafter as the wants of the Company and the public may require. To reduce these grades on the old location, to the same extent that can be easily adapted to the new, can only be done by an expenditure of time and money that renders it utterly impracticable.

It adopting the new line, it was the policy and intention of the Company

not only to insure, in the first instance, a line with a considerably less amount of maximum grades, and therefore much more economically operated, but one that can still further be improved whenever the interests of the Company or the public require it, at a comparatively trifling expense.

That this is the true policy of the Company is too palpable to admit of a doubt, and the Board of Directors could not consistently neglect to carry out the same.

I am authorized to assure you that these are the only motives which induced the change of line; and that the policy of the Company, as above indicated, will be faithfully carried out in the event of the approval by the President of the United States of the amended location, submitted to him through the Secretary of the Interior, on the 12th of May, 1865; and it, is intended to embrace all the advantages to be gained by the line down Missouri bottom several miles, and thence across the bluffs, connecting with Mud Creek line, as recently surveyed by Mr. Ainsworth; as well as the future adoption of a thirty-foot grade into the Valley of the Elkhorn.

In case the original line is adhered to by the President, it will be necessary for the Company, before the traffic of the road shall have reached one-third of its capacity for doing business west of the Elkhorn River, to construct another road from the Elkhorn to Omaha, or find another terminus on the Missouri River.

I have the honor to be, Colonel, very respectfully, your obedient servant

THOMAS C. DURANT,

*Vice President.*

*By order of Executive Committee.*

Lieut. Colonel J. H. SIMPSON,

*U. S. Engineers,*

Washington, D. C.

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UNION PACIFIC RAILROAD COMPANY, }  
Secretary's Office, 18 William Street, }  
New York, August, 29, 1865.

The foregoing communication, under date of August 25, 1865, addressed by T. C. Durant, Esq., Vice-President of this Company, to Colonel J. H. Simpson, United States Engineers, respecting the policy of this Company in regard to the location of the road between the Missouri River and the Platte Valley, having been submitted and duly considered by the Executive

Committee of the Union Pacific Railroad Company, is hereby fully approved.

In witness whereof the Secretary of the Company is directed  
[SEAL.] to affix the corporate Seal of the Company.

I certify that the above is a true copy from the minutes of the Executive Committee of this Company.

CHARLES TUTTLE,

*Secretary.*

Per B. F. BUNKER,

*Assistant Secretary.*

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*The Secretary of the Interior to the President.*

DEPARTMENT OF THE INTERIOR,

Washington, D. C., *September 23, 1865.*

TO THE PRESIDENT:

I have the honor to submit, herewith, the report, map, and profiles of Lieutenant Colonel J. H. Simpson, Corps Engineers, appointed to examine and report in relation to the application of the Union Pacific Railroad Company for an amended location of a portion of the route of their road between Omaha City, Nebraska, and the valley of the Elkhorn River.

Colonel Simpson has given this matter a thorough investigation, both on the ground and in the office; and has arrived at the conclusion that the line which the Company have proposed and pledged themselves to build, extending from Omaha down the Missouri Valley, and across the river bluff to Mud Creek, and Pappillon Valley route (No. 3) at or near Station 421; and thence on said route to the valley of the Elkhorn, as shown on the accompanying map, with ruling grades of 30 feet, ascending westward and eastward, is 15 per cent. better than any other route that can be obtained westwardly from Omaha; and therefore the best for the country which the Company could build.

I am, with great respect, your obedient servant,

JAMES HARLAN,

*Secretary.*

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[Indorsement.]

The abandonment asked for by the Union Pacific Railroad Company of the original location of their road between Omaha and the Valley of the

Elkhorn, called No. 1 in Colonel Simpson's report, with the adoption of No. 3, or Mud Creek route, is approved on the express condition that the Company amend said No. 3 line, to make it conform to the Missouri Valley or No. 4 route, with ruling grades, ascending westward and eastward, of 30 feet to the mile, as they propose.

ANDREW JOHNSON,  
*President.*



